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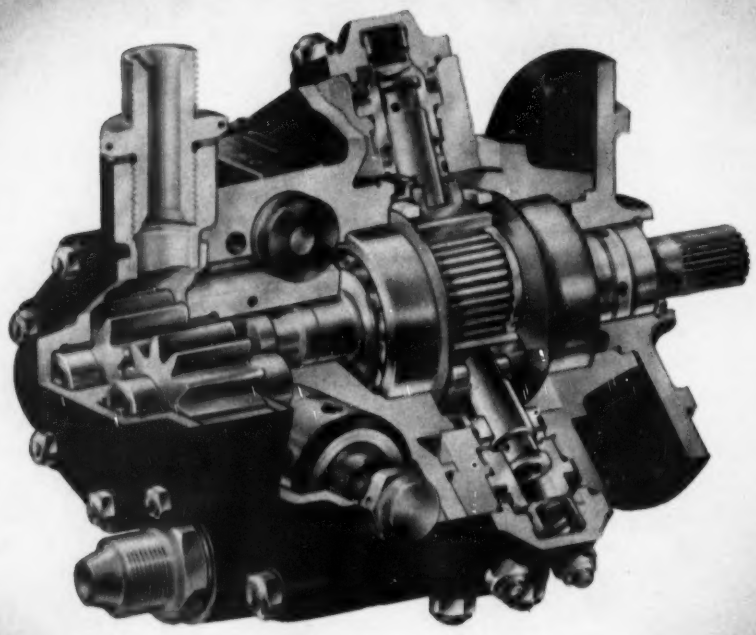

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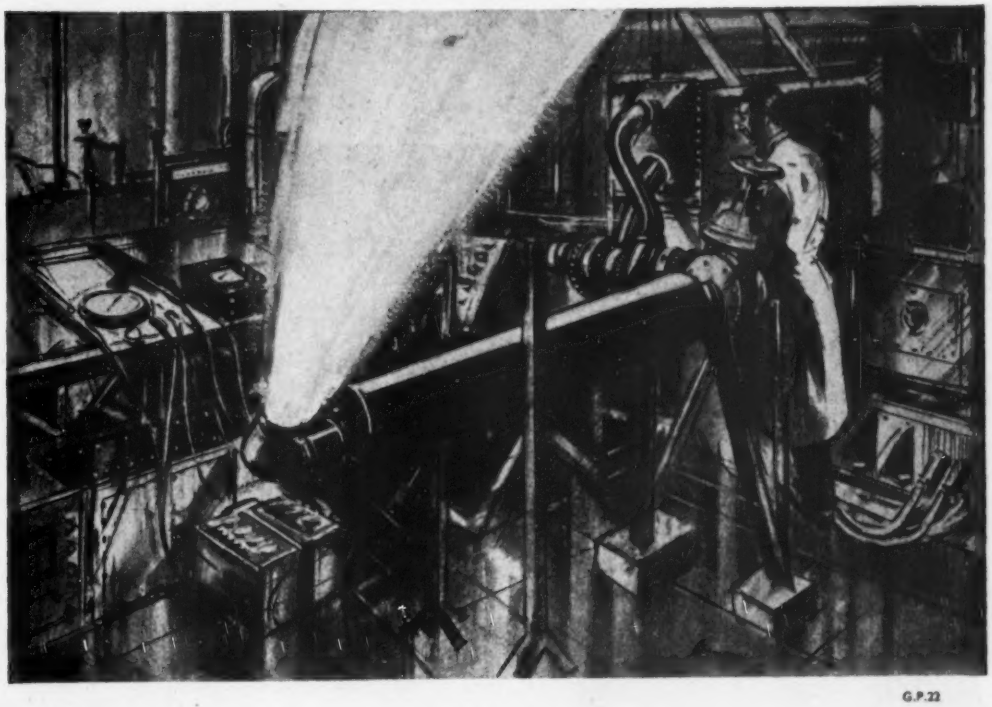

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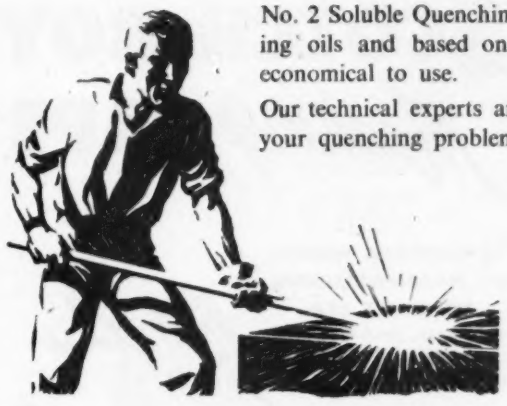

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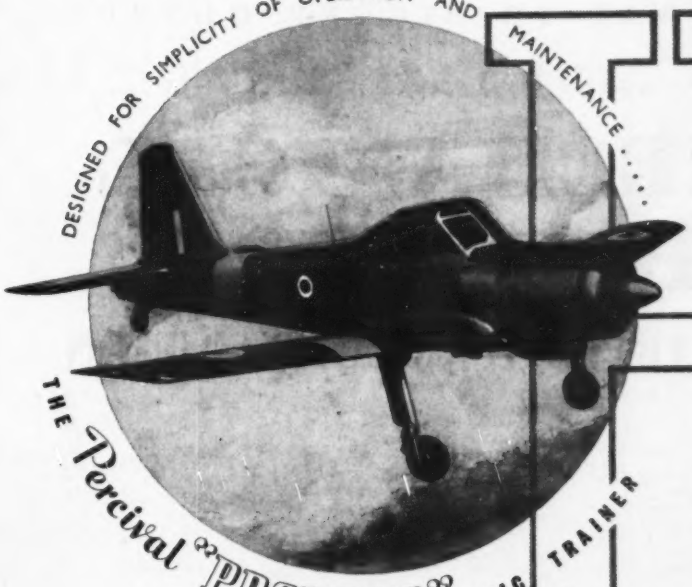

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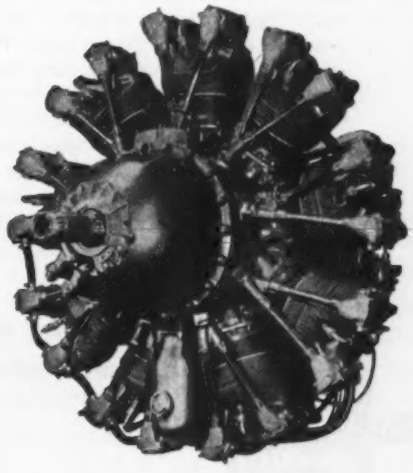

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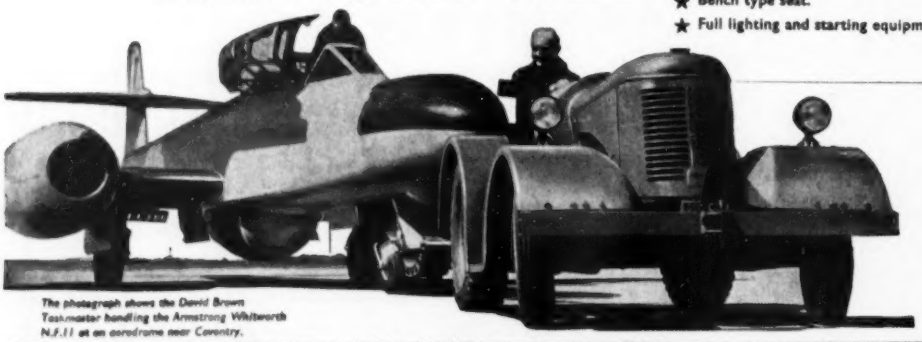

The photograph shows the David Brown Taskmaster handling the Armstrong Whitworth N.F.11 at an aerodrome near Coventry.

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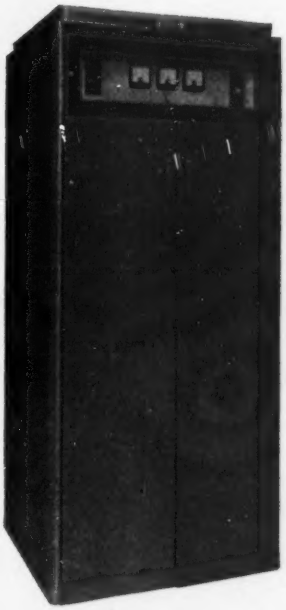

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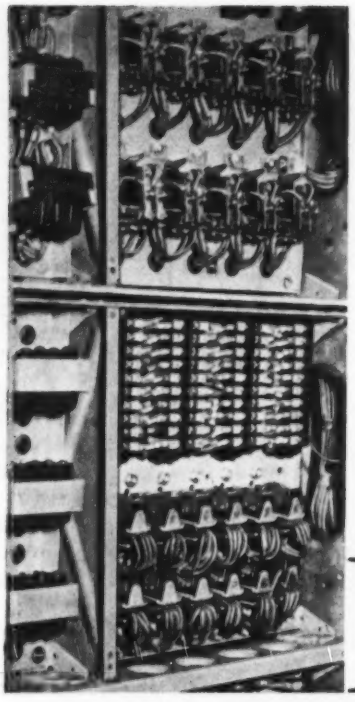

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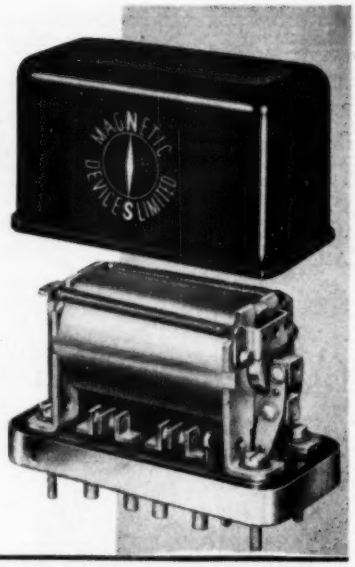

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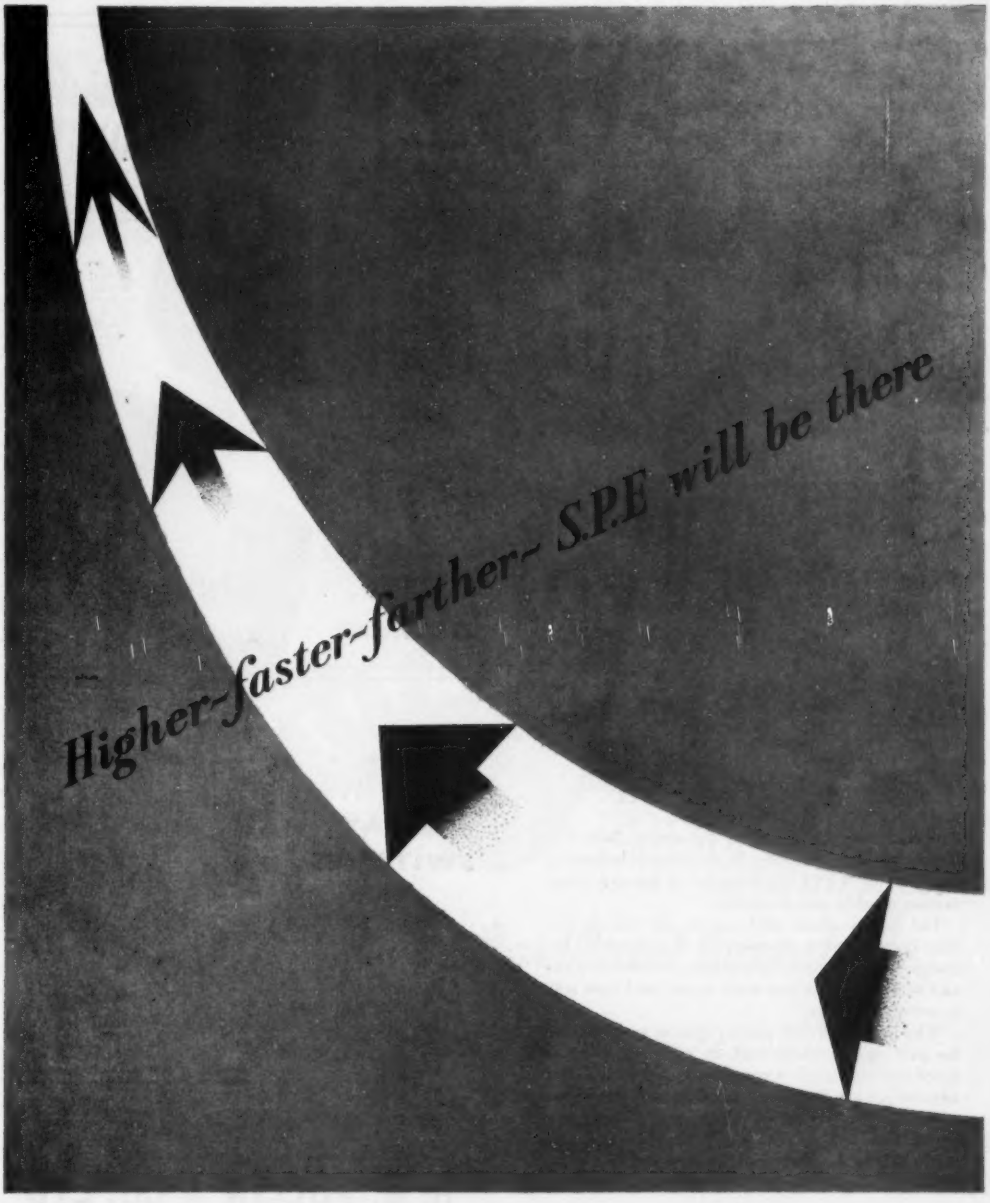

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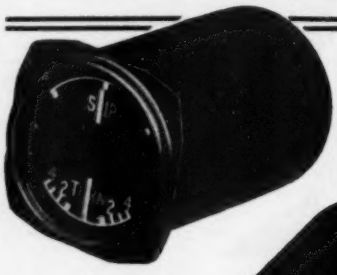

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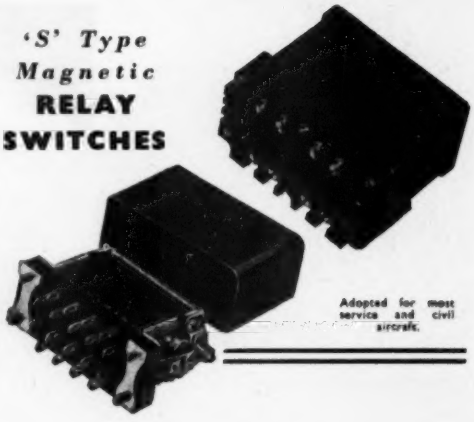

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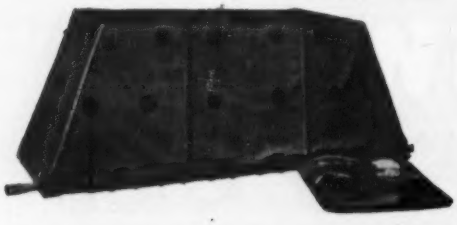

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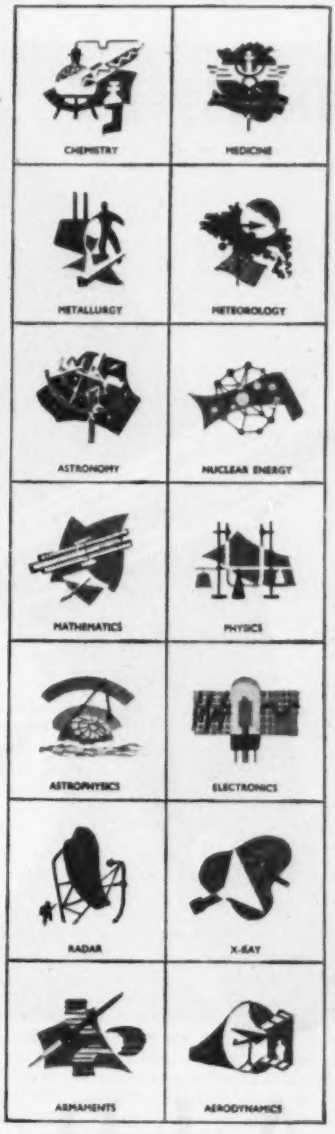

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New Fields and New Fleets

WE count ourselves particularly fortunate in being able to present in this special issue of *Flight* a series of personal messages from the chiefs of most of the major airlines, expressing views on current matters and plans for future development. The momentous happenings of recent weeks render the issue the more timely and the thoughts of the air-transport industry's leaders the more valuable and instructive. Nothing less than a new era in air transportation has been opened by the introduction of two new kinds of service to the public: one, the high-speed, first-class jet-airliner services; the other—of a complementary nature—low-fare North Atlantic flights in a variety of large aircraft.

Although these contrasting types of service will cater for the needs of a reasonably large section of the public, there is still a long way to go before flying becomes a form of travel available to all. This must continue to be the aim, and low-fare services are a big step in the right direction: there is almost unanimous agreement among the world operators that the time had come for them, and that now they are here to stay. In expressing that view, a number of executives take into account the current signs of that long-predicted "recession" which threatens to affect air travel as well as many other aspects of business and pleasure.

As the lines upon which air commerce can be expected to expand reveal themselves more clearly, it becomes less difficult to assess fleet requirements. It will be apparent to anyone who reads the messages, articles and commentaries in this issue that one of the greatest problems facing all operators is that of re-equipment. What aircraft do they want? What can they get within a reasonable time? And can they find the dollars or pounds? Our own view, expressed some months ago—that there is a unique opportunity for British constructors to get a firm footing in foreign and even American airlines—has in no way been altered by events occurring in the past half-year. Rather does there appear to be an even greater demand for several classes of new aircraft for particular duties. Moreover, the British types which the industry is now producing look even more promising as development continues.

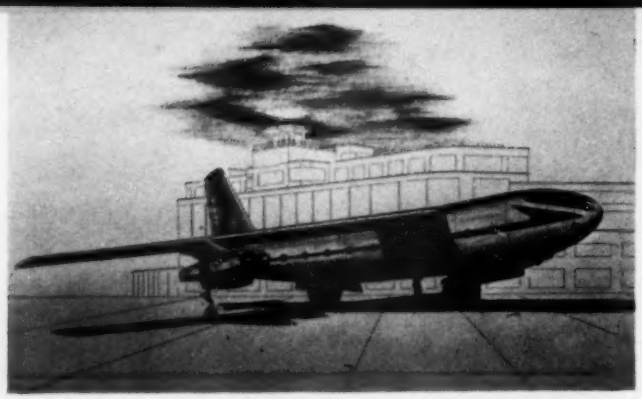
Freighters and Helicopters

There does seem to be real cause for concern over British air freighting. It is in this branch that development parallel with low-fare passenger services can be expected, and British operators in particular are in danger of being insufficiently equipped to meet it. One class of freight requires large, long-range pressurized aircraft; another needs slower, bulky-load lifters. This, incidentally, is also a serious matter from the R.A.F. point of view, for in the country's rearmament plans much reliance is being placed on the merchant air service.

Another class of aircraft now widely used for a variety of civil and military duties is the helicopter; and here, as in the case of freighters, a strong military lead would be of great national benefit. Certainly some British manufacturers are making very promising progress with helicopter design, but while thousands of these machines are now being built and flown in America, we have but a handful, and pilots are so few that, as someone at Bristol remarked recently, "We know them all by their Christian names." However, for the immediate future this state of affairs is more of a military problem, the needs of the Services being more pressing and more numerous, though less well defined. B.E.A.'s requirements for civil operation have been clearly stated, and there seems to be every chance of their being met within a reasonable time.

Finally, it is gratifying to note that resistance to the sale of British aircraft in the United States seems to be weakening, and that as a result modern British feederliners are considered to have an increasingly good chance in the American market. Moreover, the latest turbine airliners may be allowed to find buyers across the Atlantic. The need for a true modern counterpart of the Rapide remains, although America and Italy have gone some way towards filling it.

Transport Projects and Possibilities



One of a series of Boeing projects for a swept-wing jet airliner based on the design of the Stratojet bomber.

Advanced Thinking and Advanced Doing: "The Bouncing Crystal Ball"

TO an increasing degree the "security" which enwraps new military aircraft today is being extended to the civil field, as witness the continuing reticence of the de Havilland company concerning certain features of the Comet and the growing reluctance of American manufacturers to declare their intentions. The "trade secrets" entailed, however, generally concern structural techniques and detail innovations calculated to give a firm the "edge" over its competitors; the broader design-features are more generally publicized.

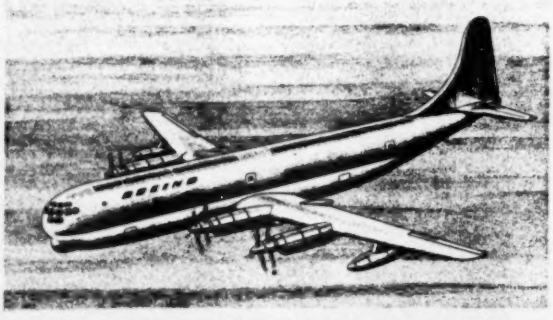
It is apparent that the keenest competition in the years ahead will centre round the pure-jet long-range airliner of the class pioneered by the Comet: and let it be remarked at once that the Comet itself appears amenable to a good deal of design "stretch." Thus would-be competitors must aim to better the performance not of the Series I and Series II, which are already flying, but of developments as yet unannounced, in which greater economy will stem from increased payload and range.

No official figures for the reported "Series III" Comet have been communicated, though it has been suggested that this Avon-powered machine, with 30,000 lb total thrust, might cruise at about 530 m.p.h. at 40,000ft or above, and that, with 10ft or so extra fuselage length, it might accommodate between 50 and 60 passengers. These characteristics should make a very strong appeal to American and other operators, whose views concerning the Comet I have not always coincided with those of B.O.A.C., with which Corporation that initial model is now in triumphal service.

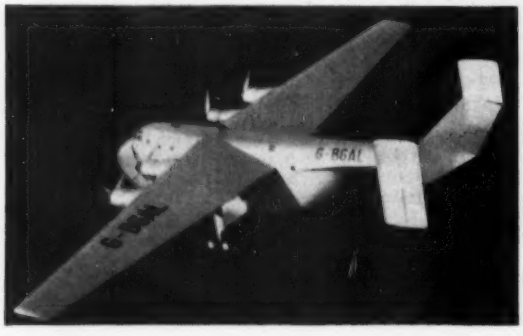
America's own plans for pure-jet airliners—insofar as they exist—are nebulous; but few illusions as to the magnitude of design and development problems can now remain. Our contemporary, *American Aviation*, quotes the Boeing Airplane Company's "realistic" estimate of the time required to deliver a new machine of this class—detailed specification and mock-up, nine months; construction of prototype, two years; evaluation and certification, two years; first production aircraft, two and a half years.

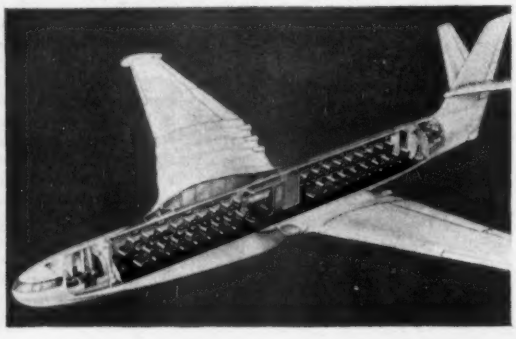
It is now many months since the Boeing company itself committed to print its tentative proposals. Three of these were depicted in sketches, and it was seen that each inherited the swept-back wings and tail surfaces, and "podded" jets, which characterize the B-47 Stratojet and B-52 Stratofortress bombers. The largest machine was for long-range trans-ocean operation and would use six turbojets, disposed two pairs outboard and two single units inboard. The fuselage of this aircraft was of "double-bubble" configuration, as introduced on the piston-engined Stratocruiser. Other proposals called for four turbojets and under-wing auxiliary fuel tanks. The company has declined to reveal any performance estimates, but has declared itself "enthusiastic over preliminary studies in this field," pointing out, however, that heavy development costs and uncertainty of licensing regulations have prevented construction of a prototype.

Solicitation of the Lockheed company for a statement on its jet airliner plans was answered with a cable to the effect that these plans are not yet ready for public announcement. The company does, however, go so far as to say that it is closely analyzing airline requirements and new technical developments, and believes that jets can be designed to operate with the same, or even better, economy than the Super Constellation, which contains a potential "stretch" to meet major competition pending widespread jet transport development. Adequate engines for the



A projected turboprop development of the Boeing C-97 Stratofreighter (right) is a long-distance, high-speed machine, whereas the Mk 2 version of the Blackburn and General Aircraft Universal Freighter (below) is for more economical operation over shorter distances. At lower right is shown the layout of the Saunders-Roe Duchess pure-jet flying-boat.





Lockheed jet are believed to be still a few years away, but Mr. Robert E. Gross, the president, believes that his company will resolve many jet questions this year and will then know more definitely the size, configuration and performances which will best serve all concerned.

As a matter of interest the characteristics of the Lockheed L-193 proposal, publicized during 1951, may be noted. This design called for four turbojets, each of 12,200 lb, installed in clusters well aft, as indicated in the sketch herewith, thereby effecting, it was hoped, a marked reduction in cabin noise level. The span was to be 104ft, length 112ft, wing area 1,615 sq ft, passenger accommodation 48 to 64, gross weight 148,000 lb, max. cruising speed 618 m.p.h. at 20,600ft, and landing speed at max. landing weight 120 m.p.h.

In a paper bearing the apposite title "The Bouncing Crystal Ball," Mr. Arthur E. Raymond, vice-president (engineering) of the Douglas Aircraft Company, has set out his own thoughts, insofar as he has considered it politic to do so. Having regard to the ambitious fuselage-stretching processes now discerned in America and to current adaptations for compound piston engines (and—later—turboprop units), one of his paragraphs has a particular significance. This runs: "There is a continuous stream of service changes, and the manufacturer constantly makes improvements. Some of these changes are so extensive that we call them modifications; in fact, I think we have upon occasion been accused of jacking up the nameplate, attaching a new airplane to it, and calling the result a modification." Other points which merit quotation follow:

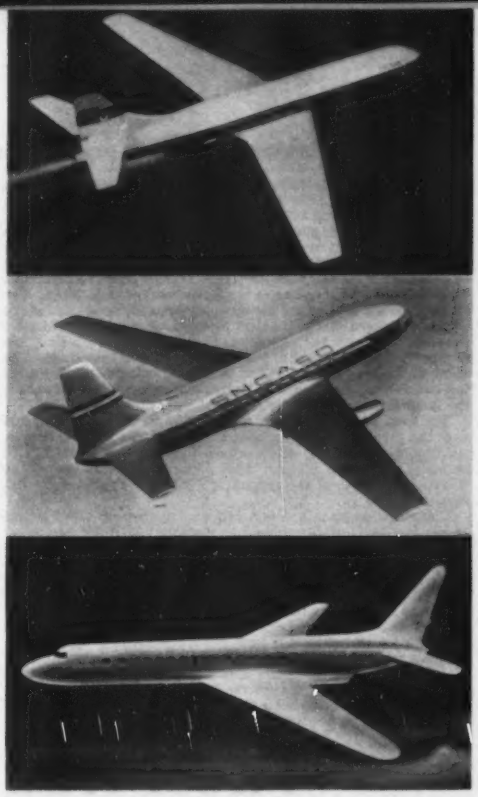
"The jet of 1957 will be superior in speed to all others but . . . we must anticipate that a period of time will be needed before we are at home with it. The advanced turboprop of 1958 should eventually have lower operating cost than all the others and should, therefore, be superior for coach and cargo work. . . .

"Afterburning or reheat is quite unacceptable, at least for commercial operation, because of the noise. It may prove true that military power ratings and their high internal temperatures shorten the life of a transport engine too much. Lower ratings will intensify the take-off problem. For these reasons, it will be prudent to design for take-off conservatively, with water injection held in reserve for hot days or high altitude fields, if this proves to be the most satisfactory way to get temporary additional power. . . .

"With current transports the drag rise starts at about two-thirds the speed of sound. This could be raised about 10 per cent by extending the leading (and perhaps the trailing) edge of the wing, thus reducing its thickness ratio, but this is about as far as we can go by modification. Starting afresh with a thinner wing we quickly find that it becomes too heavy unless it is highly tapered. Sweeping back the leading edge has much the same effect as thinning down, so with sweep-back a thicker wing can be used. This permits more span, which is needed for good range. Sweep-back and thinness both hurt stall speed and low speed stability and control. Thinness also creates limberness and limberness, unless very carefully handled, leads to flutter. So we find ourselves trying to find the best compromise, with enough thinness and sweep-back to postpone drag rise to whatever point we pick in our study of growth requirements, enough span to give the required range efficiency, enough area to give the desired stalling speed; and at the same time produce a design which requires no excess material purely for stiffness but only as much as is needed for strength, and which has the proper relationships or proportions between the wing and the fixed and movable control surfaces to give good stability, control, and flying characteristics over the entire range of flying speeds—no small order.

"In past transport designs the so-called drag-rise speed could not be approached with available engines and we were not conscious of it as a limitation except in dive tests. Beginning with the jet, we will be within striking distance of this speed during cruising flight and may expect to come to grips with it as more powerful engines come along during the life of the aircraft. We can stand a little drag-rise, but not much: we therefore are faced with deciding, in choosing the wing section, plan form, and general arrangement of any jet transport, the limiting cruising speed beyond which the aircraft will never, so far as we can see, be able to pass, regardless of engine growth. If we choose this limit too low, competition may out-distance us; if we choose it too high, practically all of the characteristics of the airplane other than speed will suffer. . . .

"It is natural to look ahead when laying out a new aircraft and try to anticipate the ways in which it may need to change during its life. The engines it uses initially will probably grow in power and other engines will come along. Not only will these higher powers bring higher speeds; they will also make it both possible and desirable to carry higher payloads. If too much of this growth is built into the initial design the aircraft may have very sorry performance to begin with; if too little thought is given to growth, the aircraft may be stunted and lose out before its development cost has been paid back. . . .



Reading down, the projected pure-jet airliners illustrated above are an S.N.C.A.S.E. with three Atar turbojets (two on the fuselage sides, one in the tail); the S.O.60—a twin-jet design; and the Lockheed L-193, with four "clustered" turbojets.

"Most everyone knows in a general way what has happened to costs and would be willing to bet that the trend will continue to be upward. As a check point, I should like to mention that if our company were to build the old standard DC-3 today we would have to charge around $350,000 for it instead of $114,000 as we did originally. We manufacturers are acutely aware that the aircraft industry of the U.S. has spent since the war about $175,000,000 more in producing civil transport aircraft than it has received for them. In face of these costs, the technical complexities (some of which I have touched on) and the market uncertainties, the only chance anyone has of bringing cost and price of a new jet transport into balance is by getting quantity production. Of course, this is true of any new transport, but the jet will present the problem in its most acute form, for, with its speed, only one airplane will be needed to do the job of two present-day airplanes of equal size, so half as many jets can carry the same amount of traffic. Also, due to its poor showing at low or moderate altitudes and speeds and the difficulties of getting into and out of small airports, its utility will be somewhat restricted and the extent to which it will share the future market with the turboprops is not at all clear. So we may expect that the designer of any new jet transport will try his best to make it multi-purpose. He will try to fit it into the trans-oceanic market, so it will be a large airplane to get the required range. He will also try to fit it into medium- to short-range operations and keep its take-off and landing distances down, at least when carrying moderate fuel loads. He will make it adaptable to all kinds of payload, and to more than one make of engine, and put into it all reasonable possibilities for growth. . . .

"In gazing into the crystal ball which is bouncing about so vigorously, we may all get strabismus, but we can at least get it together."

From this expression of good American horse-sense we may turn to a British project which is unique, in being a jet-propelled flying-boat. Designed by Saunders-Roe, Ltd., for journeys such as that between Australia and New Zealand, the Duchess, as the project is known, was originally publicized in May, 1950, with a power plant of six de Havilland Ghosts. In recent months a larger, higher-powered version, with six Rolls-Royce Avons, has been announced, and comparative data are given hereafter (figures

TRANSPORT PROJECTS and POSSIBILITIES . . .

for Ghost-powered machine bracketed): span 138ft (135ft 6in); length, 125ft (124ft 6in); loaded weight, 150,000 lb (130,000 lb); max. speed, 559 m.p.h. (550 m.p.h.); most economical speed, 475 m.p.h. (468 m.p.h.). The Avon version would climb to 30,000ft in 14.6 min and take off (10 m.p.h. wind) in 1,300 yd.

Before considering the turboprop picture, brief reference may be made to three other pure-jet proposals, by French constructors. The S.O.5100 Champagne is designed to take four Nene, Tay or Atar turbojets, and should weigh about 110,000 lb; speeds of the order of 470-510 m.p.h. are foreseen. For a smaller design, proposed by the S.N.C.A.S.E. group, three Atar turbojets, two on the fuselage sides and one in the tail, are specified. The third type, designated S.O.60, is smaller still, being intended for two Avons, Sapphires or Atars, suspended in pods beneath the swept-back wings. So much for the pure jets.

The most advanced turboprop transport which may be referred to at the present time is unquestionably the Bristol 175 Britannia, some notes concerning which appear in the review pages of this issue. The feature entitled "How Good is Good?" (page 608) moreover, brings out the remarkable economy promised by this British design.

Illustrated on page 576 is a proposed turboprop development of the Boeing C-97 Stratofreighter; adaptation of the passenger-carrying Stratocruiser would, of course, be similar, and the Boeing company declares that relatively minor design changes render these machines "virtually made to order" for the new installation, resulting in increased speed, range, payload and operating height. Similar benefits are foretold for the turboprop development of the Lockheed Super Constellation, a development order for which has already been placed by the U.S. Navy.

Apart from the proposed long-range turboprop Stratofreighter already mentioned, the years ahead may see similar adaptations of the large Douglas freighters, including perhaps the Globemaster, at present restricted to military service. Four Pratt and Whitney T-34 turboprops have been named as the power plant of this 175,000 lb machine, which, like its piston-engined precursors, should be capable of relatively long range.

For shorter distances the Mk 2 version of the Blackburn and General Aircraft Universal Freighter (see page 595) typifies the latest thinking in this country.

The most cursory review of future commercial aircraft must not fail to touch upon the important helicopter developments now in prospect. In this country the latest design to be announced is the Bristol 181, a scaled-up development of the Type 173 described elsewhere in this issue, and intended to carry 40 passengers. During April it was made known that British European Airways would wish to start operating the type by 1958, which would mean that a C. of A. would have to be obtained by 1957 and that test-flying would have to start in 1955. Another British design, represented in model form at the last S.B.A.C. Display, was the Fairey Rotodyne, which for take-off and climb would function as a true helicopter but for normal flight and landing would fly as a fixed-wing machine with the addition of an auto-rotating rotor. At the tip of each of the four rotor-blades would be small jet ducts, and it is presumed that air supplied by the compressors of the turboprop units would be fed to these, together with fuel, and the mixture there burned to drive the blades.

Westland projects are the W.80, W.81 and W.85. The first of these is a twin-Leonides single-rotor 20-seater, likely to serve as a stepping-stone to the larger (30-seat) W.81, which will employ an internally housed power installation quoted as being "of the twin-Mamba type driving the four-blade rotor through a right-angle gearbox." The W.85 is primarily a military concept with a box-car fuselage, capable of carrying 100 fully equipped troops or equivalent load.

Singled out for mention by Lord Douglas of Kirtleside, chairman of B.E.A., during his recent American tour was a Piasecki military design now on the drawing-board and having a fuselage of Convair 240 proportions. This twin-rotor machine is expected to fly before the end of the year.

FROM ALL QUARTERS

The New Minister—and M.C.A.'s Future

THE resignation of The Hon. J. S. Maclay from the post of Minister of Transport and Civil Aviation, announced on May 6th, did not come as a surprise; for several weeks past he had been showing the effects of strain, and his decision to step down followed a medical opinion that he was likely to remain unwell for some weeks.

During his six months in office his routine work had been greatly complicated by the heated political controversies which have centred upon several aspects of transport administration, and these additional burdens will now fall upon the shoulders of his successor, The Rt. Hon. A. T. Lennox-Boyd, whose appointment was announced from Downing Street on May 7th.

Mr. A. T. Lennox-Boyd

During the time since the present Government was elected, Mr. Lennox-Boyd has been Minister of State for Colonial Affairs. Now forty-seven years of age, he was educated at Sherborne and Christ Church, Oxford, and entered politics in the 1930s. Between 1938 and 1945 he was, successively, Parliamentary Secretary to four Ministries—Labour, Home Security, Food and Aircraft Production (his M.A.P. appointment was from 1943 to 1945, when aircraft production reached its peak). For two years during the war he served as a lieutenant, R.N.V.R.

How much will the words "Civil Aviation" mean in Mr. Lennox-Boyd's Ministerial title? Certain developments at Westminster last week suggest that the days of the Ministry of Civil Aviation, as such, are numbered.

Some had thought that a reference to the future of civil aviation in the transport framework would be incorporated in the Government's White Paper on Transport. That was not to be; but, the day before publication of this document, a clear indication of the Cabinet attitude was given by Lord Leathers, the Co-ordinating Minister for Transport and Fuel and Power. He was asked by Lord Pakenham, a former Minister of Civil Aviation, whether the Government had arrived at any decision with regard to the future of the Ministry.

His reply was that apart from the appointment of Mr. Reginald Maudling as Parliamentary Under-Secretary on April 19th, no further change was at present contemplated.

Lord Pakenham then drew attention to the "great anxiety" being caused to a large number of devoted public servants by the lack of a definite assurance. Lord Leathers confessed himself surprised that that anxiety had reached such a high pitch. He promised that these and other relevant matters would be "very carefully considered."

A reference was then made by Lord Ogmore, another former Civil Aviation Minister, to Mr. Maclay's breakdown. Lord Leathers expressed himself as unable to say whether Mr. Maclay's illness was caused by the complexity of his combined duties as Minister of Transport and Civil Aviation.

Then came these significant words—"All I can say is that civil aviation is a relatively small Ministry and in our view hardly justifies a separate Ministry."

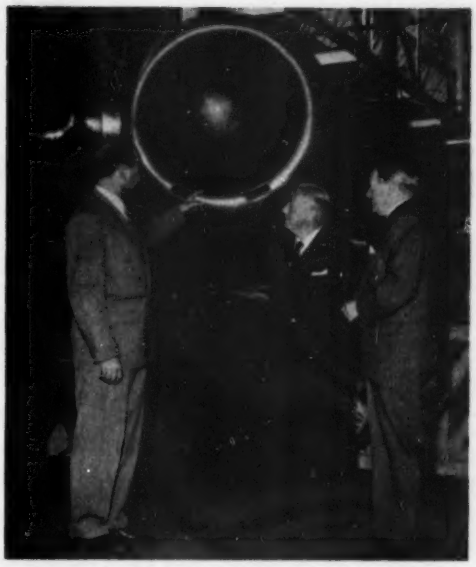
He added that he had reported this view before, and would follow it up "at a later date." All these matters affecting civil aviation were having immediate attention; he himself was devoting a good deal of time to them, and the new Minister of Civil Aviation would be asked to co-operate with him on all the questions that were of urgent importance.

Lord Lucas then asked the Government to agree that the British people had ground for intense pride upon the latest advancement of the British aeronautical industry in the successful launching of the Comet. With this Lord Leathers concurred.

Meanwhile, it has been rumoured in some quarters that a "Civil Aviation Division," headed by an Under-Secretary, is likely to be formed within the Ministry of Transport and that Lord Leathers will assume overall responsibility for policy. Others maintain that, judging from the White Paper proposals on road haulage, a much more radical change is impending and that the M.C.A. will be so emasculated that there will be no need for even an Under-Secretary to look after its affairs.

Holders of this view recall that the Conservative Manifesto spoke of "a combination of public and private enterprise." They are convinced that this principle could be applied very widely indeed without any new legislation being involved; at most, they say, the revocation of the appropriate orders and regulations affecting licences and so forth would suffice.

By the time these words appear, of course, some more definite indication of Government intentions may have been given.



"IT GOES IN HERE—": We can only surmise that the dissertation by Mr. Crawford Gordon, Jnr., concerning features of the Orenda-powered Avro Canada CF-100 fighter, is not of the elementary nature suggested by this picture, for his audience will be recognized as Sir Frank Spriggs and Sir Roy Dobson, whose knowledge of "jettery" is by no means superficial. The artisan plying his screwdriver seems to have heard it all before and twirls away unmindful of the presence of his genial chiefs.

Airmet: Outlook Still Gloomy

THE now only-too-familiar answer that "there is still no prospect of a suitable frequency being made available for the purpose" was given in the House of Commons on May 8th, to a question about the possibility of the Airmet service being revived.

Sir Ian Fraser had asked the Under-Secretary of State for Air whether, in conjunction with the Minister of Education, he would consider the reinstatement of the broadcasts "for teaching purposes and as a general aid to navigation and farming."

Mr. G. R. Ward said in reply that the Meteorological Office was ready to resume forecasting for Airmet at any time; then, repeating an earlier answer by the Assistant Postmaster-General, he made the remark quoted above, saying that the A.P.M.G. and himself "did not think that any useful purpose would be served at present by fresh inter-departmental discussions." He added: "We do, however, appreciate that several classes of the community, including private fliers and farmers, are anxious that the service should be restored. I can assure my hon. friend that if the situation changes the claims of Airmet will be given every consideration."

A Display in Devon

OPENED by Mr. G. R. Ward, M.P., Under-Secretary of State for Air—who arrived, appropriately, in a de Havilland Devon—the flying display at Exeter Airport last Saturday in aid of the Cathedral Preservation Fund was above average both in scope and in execution. It was, therefore, all the more unfortunate that showery weather kept the attendance to less than half the 1951 figure of 10,000.

Particularly praiseworthy was the tied-together flying of three Tiger Moths from No. 10 R.F.S.; they remained linked in spite of the anything-but-helpful weather. The crazy-flying of S/L. "Dusty" Miller of No. 12 R.F.S. in a Tiger Moth was as good as any we have seen, while other individual demonstrations were given by F/L. Gordon (Meteor T.7)—noteworthy for outside turns and inverted climbs; F/L. Hampton (Spitfire 21); and a civilian pilot, A. W. Woolley (Beaufighter T.T. 10). The two latter aircraft came from No. 3 C.A.A.C.U.; this unit also gave a lively ground-attack display with Spitfires.

Regular naval units taking part included No. 809 Squadron (Culdrose, Sea Hornet N.F. 21) and No. 803 squadron (Ford, Attacker F.1); both units gave polished demonstrations followed by stream landings. An unexpected feature of No. 803's flying was a very-American commentary, given over the public-address system by Lt. Chandler, U.S.N., who is attached to the squadron while here on an exchange visit. He spoke highly of the Attacker.

Last, but by no means least, three of the familiar Stampe S.V. 4Bs of La Patrouille d'Etampes provided flying of the type which has by now earned them a unique reputation in most European countries. Kerguelen, Darbois and Claveau were the pilots; on this occasion the usual individualist—Menard—was the victim of aircraft-unserviceability.

Another Canberra Record

CLIPPING one and one-quarter hours off the previous record—established on March 17th by an R.A.A.F. Canberra—a similar aircraft reached Laverton, Melbourne, last week in the (unconfirmed) flight-time of 23 hr 5 min from Lyneham. S/L. P. G. Fisher, R.A.A.F., who delivered the aircraft, is reported as having chosen cruising heights of between 30,000ft and 46,500ft; ground speed was apparently 600 m.p.h. over the Mediterranean, and 515 m.p.h. calculated as an average for the 11,975-mile flight.

Elapsed time for the flight was increased by the occurrence of slight radio unserviceability in India and of a leak in a wing tank at Singapore.

Missing over the Timor Sea

AS we go to press there is still no news of the Proctor which Mr. Martin Cherry was flying from England to Australia, and which was reported missing over the Timor Sea last Sunday. Mr. Cherry, who was accompanied by his wife—their wedding was only a month ago—had left Kupang, Timor Island, and was due at Darwin at 2.45 p.m.; at dusk there was no report of their arrival at any part of the North Australian coast. The Proctor, which had no radio, carried fuel for six hours, giving a still-air range of about 800 miles; the crossing from Kupang to Darwin is about 525 miles, and it was reported from the Australian end that a strong head-wind was blowing. An R.A.A.F. Lincoln was despatched on a sea search, and preparations were made for a Dakota and a Lincoln to examine the coastline, which is of a very wild and irregular nature.

Mr. Cherry is an Australian who had lived in England for the past three years, during which time he was with Handley Page (Reading), Ltd. Last November he flew a Proctor out to Australia with two passengers; eleven months earlier he had delivered an Aerovan from Reading to Benguella in S.W. Africa.

Comet in South Africa

LAST week we gave an impression of the departure of the first Comet service for Johannesburg on May 2nd. Its arrival there, less than 24 hours later, has been described for us by Mr. E. N. Tucker, editor of *Wings*, who writes "The Comet is certainly something of which Britain can be immensely proud. It has been the general topic of conversation here for days."

Of the actual arrival, he writes: "When the Comet landed at Palmietfontein Airport at 15.35 hours (South African time) on May 3rd, 20,000 people crowded round the enclosures to give the airliner the biggest welcome accorded to pioneers since the days of Sir Pierre van Ryneveld, Lieut. Dick Bentley and others who first flew from England in the 1920s. Many of those present

MASS IN MANŒUVRE: Easy handling is not the least of the qualities possessed by the Short S.A.4 jet bomber (four Rolls-Royce Avons) and manifest in the continuing trials with this capacious machine. The unusual system of superposing the turbojets will facilitate the installation of experimental units. A new photograph is printed here.

FROM ALL QUARTERS . . .

recalled seeing the finish of these historic flights, many of them in single engine aircraft—de Havilland products among them.

"Sir Miles Thomas, who had joined the Comet at Livingstone was supremely delighted at this proud culmination of the Comet's development. 'The first civil jet service that has been opened between London and Johannesburg today is four years ahead,' he said. 'The flight has gone through without a hitch and I would like to say that the principle of jet propulsion was the outcome of British enterprise and British ingenuity. It was forged in the fires of war and today it starts making its contribution to peace and prosperity. As chairman of B.O.A.C. I am extremely proud that we have had the honour of introducing this remarkable new form of travel to the world.' An American who had joined the Comet at Livingstone, he added, was 'completely astonished at the whole thing.'

"Sir Miles Thomas stated that an improvement in the overall time for the route would be a gradual process, but B.O.A.C. would get it down to something like 21 hours. Inclusive of the stop at Beirut, which had added 450 miles on to the route, it was possible to cut an hour off: 'I do not want to forecast, but we have got a very considerable amount of time up our sleeves.'

"Although there has been some criticism of the long period on the ground which passengers emplaning at Johannesburg have to spend (partly because of the necessity to visit the old Rand Airport buildings for Customs and emigration purposes until the buildings at Jan Smuts Airport are complete), it is pointed out by B.O.A.C. that in fact the time involved is only 15 minutes more than that required for departure by the other airlines which are still using Palmietfontein.

"The Comet has made a most profound impression in South Africa; civil aviation officials, travel representatives and members of the Press who have been given courtesy flights are unanimous that public preference will be strongly in favour of the Comet in spite of its five stops en route. Apart from the fact that even with these stops the overall time to England is less than that taken by piston-engined aircraft, the absence of vibration, the smooth flying and the magnificent standard of service which B.O.A.C. has attained both in the air and on the ground are factors which competitors will find it exceedingly hard to meet."

Bristol Earnings Up

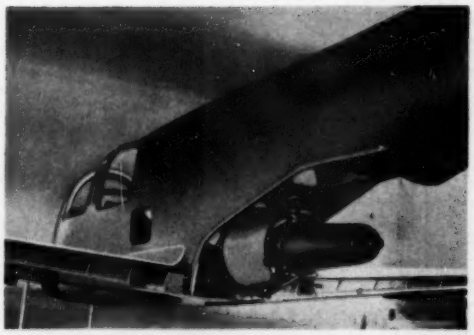
AT a meeting of the board of the Bristol Aeroplane Co., Ltd., held last week, the directors decided to recommend a final dividend of 8½ per cent (subject to income tax) on the Ordinary stock, amounting to £147,263 net. This made a total distribution of 13½ per cent for the year ended December 31st, 1951, compared with a total distribution of 12½ per cent for the previous year.

The net profits shown in the consolidated profit-and-loss account amount to £566,573 (1950, £486,482) after charging taxation at £941,455 (1950, £694,571) and crediting a sum of £125,000 (1950, £23,600) in respect of awards for use of certain designs. In addition, an amount of £778,886 released on the final settlement of war-time taxation liabilities has been transferred from the provision-for-taxation account to general reserve.

The date of the company's annual general meeting is fixed for Thursday, June 5th.

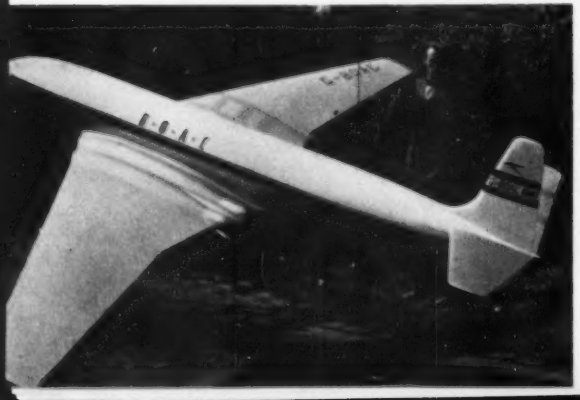
Mr. W. R. Verdon Smith, a joint managing director of the Bristol Aeroplane Company and president of its Canadian subsidiary, has recently visited Canada following a business trip to Australia. While in Montreal last month (reports our Canadian correspondent) he announced plans for construction of a $2,000,000 aircraft overhaul plant in Montreal North on a site of about 1,000,000 sq ft, where building is to start within the next few weeks. The company has a smaller factory in Montreal East, but when the Montreal North plant is built, said Mr. Verdon Smith, work will be transferred there "to expand our facilities." The present plant employs about 459; the new one will offer work to 700.

In addition to the Montreal East works and its headquarters in the International Aviation Building, the Bristol Aeroplane Co. of Canada, Ltd., has a factory in Vancouver.



TUMMY TURBOJET: Under construction at the Caproni factory at Trento is this Turboméca-Palas-powered light aircraft known as the Frati F-5. With a span given as only 25ft 9in, this interesting design is the second "F-5" from Signor Frati, the first being a fighter of 1940.

REPLICA: This beautifully finished one-eighth-scale model of a Comet was made for the B.O.A.C. stand at the Olympia section of the British Industries Fair. Built of aluminium sheet round a wooden frame, it weighs just under 1 cwt. It was constructed by Shawcraft Models, Iver, Bucks, who also built a Viscount model, to a similar scale, for B.E.A. The Comet's registration looks a little unconventional.



At the B.I.F.

TODAY, May 16th, is the final day of the 1952 British Industries Fair, held at Castle Bromwich, near Birmingham, and Earls Court and Olympia, London. Though exhibits of direct aeronautical interest have not been shown in any considerable numbers at any of the three exhibitions, many firms well known in the industry have been represented, particularly at Castle Bromwich, where the engineering section of the Fair is accommodated.

The majority of the concerns who make complete aircraft components have reserved such items for the more appropriate S.B.A.C. Show at Farnborough in September, and at the B.I.F. have contented themselves with a few odd token exhibits, among their other products, to suggest their contribution to the aircraft industry. Nevertheless, at Birmingham in particular, we found a good deal that was of interest—even if, in certain instances, it was merely some item in quite another field of engineering—something so remote from aircraft manufacture that we had never even suspected the firm concerned to be interested in it!

Certain other products, however, even when displayed to appeal to other industries, clearly had definite aircraft applications, and we intend to publish some notes on a number of them in next week's issue.

Britain's Air Attachés

BRITAIN now maintains 30 air attachés and seven assistant air attachés in countries abroad. This information—no secret to those who have access to a current *Air Force List*—was given in the House of Commons last week by the Under Secretary of State for Air, who had been asked by Mr. C. I. Orr-Ewing if he would give details of the present totals and ranks, and comparative figures for a corresponding date last year. The Air Minister provided the following data :—

	As at May 1st, 1951		As at May 1st, 1952	
	Air Attachés	Assistants	Air Attachés	Assistants
Air vice-marshal ...	1	nil	nil	nil
Air commodores ...	5	nil	6	nil
Group captains ...	10	nil	10	nil
Wing commanders ...	13	1	14	1
Squadron leaders ...	nil	5	nil	5
Flight lieutenants ...	nil	1	nil	1
Totals	29	7	30	7

A number of explanatory notes accompanied the Minister's figures; they did not, however, greatly affect the overall picture, with the possible exception of one which pointed out that certain of the posts in the table were in fact established for, and held by, officers of one rank lower; the higher ranks shown were honorary ones for local prestige purposes.

PATHFINDERS TOGETHER AGAIN

—With the C.A.S. and the Air Minister as Guests

FAST becoming one of *the* occasions of the year, the Pathfinder Association dinner held at the Dorchester Hotel, London, on Wednesday, May 7th, was once again most enjoyable. During dinner Her Majesty the Queen's reply to a loyal message was received, and a message was also read from Marshal of the Royal Air Force Sir Arthur Harris.

The speeches were all worthy of the occasion. Lord Morris, proposing "The Royal Air Force," said that the dinner was now recognized as an occasion when Pathfinders could hear from the *élite* of the Service what they had done since the last meeting; what they were doing; and perhaps—if a corner of the curtain could be lifted—what they planned to do. Lord Morris wished Sir John Slessor to know that Pathfinders were keenly interested in the fortunes of the Royal Air Force, and wished Sir John and his men well. He concluded: "Maybe there is some key to survival other than air power, but if so it has escaped my attention."

The Chief of the Air Staff, Marshal of the Royal Air Force Sir John Slessor—making his first appearance at a Pathfinder Association dinner—spoke of his vivid memories of Bomber Command in war-time, and of the Pathfinders and crews "who did the job." He had a special word to say for 5 Group. He referred to the difficulties arising from the doubling in size of the Air Force, a move unprecedented in peace-time. Dilution had been inevitable at first, and an enormous number of training units had been established; now, after 18 months, results were beginning to be seen. At one time there had been doubts as to whether such an expansion was possible, but he was sure that it would be successful. The Air Force was fortunate in having a large number of first-class men in the "middle block"—squadron leaders, wing commanders and group captains—with enormous experience of war and of leading men in battle. Never before had there been so much of this kind of experience.

For economic reasons, Bomber Command had necessarily been left in the doldrums for a time, but now new equipment was coming through, and the Canberra—a good light bomber—was a start. What Sir John referred to as the real bombers—big, heavy jet bombers with long range, such as the Valiant—which might be standardized, were also coming along. He repeated that it would be absolutely fatal to adopt for any reason a policy of leaving bombing to our American friends. He believed that no one would be more dismayed than the Americans if we decided to go out of the bombing business.

A.V-M. Don Bennett proposed "Bomber Command." In answer to the remarks of the C.A.S. on the start of Pathfinding and on 5 Group's contribution, A.V-M. Bennett said that he believed that P.F.F. had its origins in 1940 and that the man "most primarily involved" was one John Baker. He had read in the American Press that the Russians were building 800 Mig 15s per month, and he felt that this was the best compliment that could be paid to Bomber Command. In any war that might come, the Command would be as important as ever. He hoped to see a more powerful Bomber Command, and he also thought that the best equipment should again be given to those who could lead the rest.

Deputizing for his A.O.C.-in-C., Air Chief Marshal Sir Hugh P. Lloyd (who was at that time on his way back from America in a Canberra), A.V-M. Sir Francis Mellersh replied to A.V-M. Bennett's toast. He said that the Washingtons were doing very well, and that the R.A.F. were now getting more hours and better engine reliability out of them. Moreover, the crews liked flying them. Though increasing numbers of Canberras were being received, they lacked equipment to make good bombers; but this would come later, and there was also the pleasant prospect of Valiants. But here again equipment must be perfected to allow these aircraft to be used and the best to be got out of them. The Bomber Command of the future would be quite small; there would be no thousand-bomber raids, so they must depend upon efficiency and accuracy to pack the biggest possible punch. P.F.F. came last time to improve accuracy; this time Bomber Command must be able to hit the target every time. They could not afford to do otherwise. Somehow they must get electronic devices which would enable them to hit the target in any weather from between 45,000 and 50,000ft and at 450 to 500 kt. In addition, it was vital that this special equipment should be reliable.

G/C. Birkin, vice-president of the Pathfinder Association, proposed "The Guests" in a most amusing speech. He reminded members of Lord Tedder's words that a club should be constructive, not just reunite. Present at the dinner were Pathfinders from Comet and transatlantic Canberra crews.

The Secretary of State for Air, Lord De L'Isle and Dudley, V.C., said that from his own experience on the Franco-Belgian border in 1940, he had learned that it was a great thing to have air power and a greater thing to have it on your own side.

The president, Dr. MacGown, concluded the formal part of the evening with his brief toast to "Absent Friends." He said we never forgot those with whom we served.

Helping Young Aspirants

YOUNG men who desire to enter the aircraft industry by way of firms' apprenticeship schemes, but who foresee difficulty by reason of personal financial stringency, are reminded of the existence of the Society of British Aircraft Constructors' educational grants.

The value of these grants varies in individual cases, but the intention is to supplement the holder's means to an extent which will permit him to maintain himself during his training.

The minimum academic qualifications for apprentice aeronautical engineers are, normally, the possession of the recognized General Certificate of Education with a pass at ordinary level in mathematics and a science subject. Selection is by interview and candidates may be called upon to pass a test or examination.

Full details are obtainable from the Society of British Aircraft Constructors, 32, Savile Row, London, W.1.

A New Post for Miss MacPhee

WELL known as assistant secretary of the Helicopter Association of Great Britain, Miss Sheila MacPhee has left that post in order to become a B.E.A. stewardess; she has successfully completed the six-week training course. When the Corporation puts its first large helicopter into service, and if a stewardess is carried, will she be Miss MacPhee? She should certainly be able to bring the strength of her convictions into instilling confidence into the passengers. All who knew her will wish her luck.

From Air to Road

WITH the coming of tourist fares on the transatlantic air services the operators of a car-hire system which is effective on both sides of the ocean are expecting a further increase in their business. The system is one which we have seen in action at airports in the United States, and we have now obtained some information about its working. It is run by the Hertz Driv-Ur-Self System, Inc., Chicago—who claim to be the world's largest car-hire company—and the British end of the business is in the hands of Godfrey Davis, Ltd., of London.

The plan works very simply. A prospective tourist can arrange to have a rented car awaiting his arrival in Britain merely by applying for it at any one of the more than 500 Hertz agencies in the United States, Canada, Mexico, Hawaii, and Alaska. If he prefers, he can make the reservation at the airline office or travel agency when he buys his ticket. In either case, he need only present a currently valid driver's permit. At this point, Hertz and Godfrey Davis take charge. Reservation forms are sent ahead to London, where advance arrangements can be conveniently made for a British driver's licence and international driver's permit, valid anywhere in the United Kingdom or on the Continent, as soon as he arrives in this country. Additionally, if a tourist desires itineraries for his tours, he can enclose a request with his application form. The Godfrey Davis organization will then prepare an individual portfolio of information, and deliver it with the car. It includes route maps, an explanation of British traffic directions and signals, background information on points of interest, a directory of hotels and restaurants, currency-exchange information, and other details. Should the itinerary include a trip to the Continent, Godfrey Davis will arrange all details of transporting the car across the Channel.

We understand that, for British visitors to America—always provided, of course, that their personal dollar-arrangements permit—a comparable system operates there; in this case preliminary application is made to Godfrey Davis, Ltd., 7 Eccleston Street, London, S.W.1.

HERE AND THERE

U.S. of S. in a Canberra

MR. GEORGE WARD, Under-Secretary of State for Air, flew for an hour last Friday in a Canberra from Bassingbourn. His pilot was F.L. David Roberts, who, until recently, was A.D.C. to the Governor-General of New Zealand.

Swedish Interest in Helicopters

DR. G. HISLOP, Ph.D., B.Sc., M.I.Mech.E., A.F.R.Ae.S., who is in charge of B.E.A. helicopter development, is flying to Stockholm, at the invitation of the Swedish Institute of Engineers, to deliver a lecture on May 27th on the operational economics of helicopters.

Bigger Banana

UNDER development for use as a standard U.S.A.F. transport and rescue helicopter, the twin-rotor Piasecki H-21 flew for the first time on May 5th. The H-21 is a twenty-seater, powered by a Twin Wasp; it is, therefore, appreciably larger than previous Piasecki helicopters, most of which have been built for the U.S. Navy.

General Vandenberg

ALTHOUGH Gen. Vandenberg, the Chief of Staff of the U.S.A.F., is reported to be progressing favourably after a major operation, it is felt that his health will not stand up to the strain of his position and that a successor will shortly have to be appointed. The hypothetical short list of candidates includes the names of Generals LeMay and Twining and Lt.-Gens. Norstad, White and Kudir.

Lengthy and Lonesome

FUTURE deliveries of U.S.-built fighters to N.A.T.O. air forces will be made by flying the aircraft—F-84E Thunderjets—across the Atlantic. Aircraft of this type have already been flown by the U.S.A.F. to Prestwick, *via* Labrador, Greenland and Iceland, representing a ground distance of some 3,855 miles. N.A.T.O. countries are also to receive numbers of Lockheed T-33 trainers, but it is not known whether air-delivery will be attempted with these aircraft.

Ninety Degrees North

FROM the headquarters of the U.S.A.F. Alaskan Air Command at Anchorage comes the announcement that a ski/wheel-equipped Douglas C-47 landed on packice at the geographic North Pole on May 3rd. This is the first such polar landing to have been made; the party spent over three hours gathering meteorological and geophysical data before leaving for Fletchers Island—which floats about 135 miles from the Pole—where preliminary reports were prepared. This island, incidentally, has been occupied by three U.S.A.F. meteorological observers—put down by an aircraft—since March.

IN MEMORY OF PIONEERS: This design for the Alcock and Brown memorial at London Airport has been executed by the sculptor William MacMillan. Though it has not yet been officially approved, it is understood to be a very likely choice; the final decision rests with Lord Brabazon.

XB-51 Lost

ONE of the two Martin XB-51 triple-jet attack bomber prototypes is reported to have crashed at Edwards A.F.B., Muroc, California.

The Other Fireflies

TWELVE Fairey Firefly 12ft sailing dinghies were recently delivered to the R.A.F. Sailing Association's new centre at the Welsh Harp, Hendon, where they were ceremonially accepted by A. Cdre. A. W. B. McDonald, commodore of the R.A.F.S.A., in company with a number of senior officers. The 12 dinghies are named after historic Service aircraft types—Fawn, Gamecock, Hawfinch, Iris, Nighthawk, Osprey, Plover, Seagull, Siskin, Swordfish, Tomtit and Woodcock. The R.A.F.S.A., which is open to all ranks, has adopted the Firefly as the standard class for its centre after experience with the craft in competition with others at stations at home and abroad.

A.T.A. Ceremony

ON Saturday, June 7th, at 3 p.m., the Air Transport Auxiliary Association is to dedicate an A.T.A. flag at White Waltham Church. A re-union, and the A.G.M., will follow at 5 p.m. at the airfield.

Critical Appraisal

MEMBERS of the Air Board of the N.A.T.O. Standardization Military Agency visited Melun, near Paris, last week in order to obtain first-hand evidence of the quality of two Dassault Mystère prototypes. The chairman of the board is A. Cdre. Guy Hayes, R.A.F.

IN BRIEF

MR. DUNCAN SANDYS, the Minister of Supply, recently visited the Handley Page works at Cricklewood and was shown the company's latest production developments.

* * *

Mr. E. C. Tyler, who for many years has been commercial manager and secretary of Reynolds Tube Co., Ltd., has been appointed a director.

* * *

Fifty years of manufacturing at the Rugby works of B.T.H., Ltd., were celebrated by 250 members of the firm at a luncheon on May 2nd.

* * *

When Ferranti, Ltd., held their recent staff dinner at Manchester, 60 members of their Edinburgh factory staff were flown there and back in two Pionairs chartered from B.E.A.

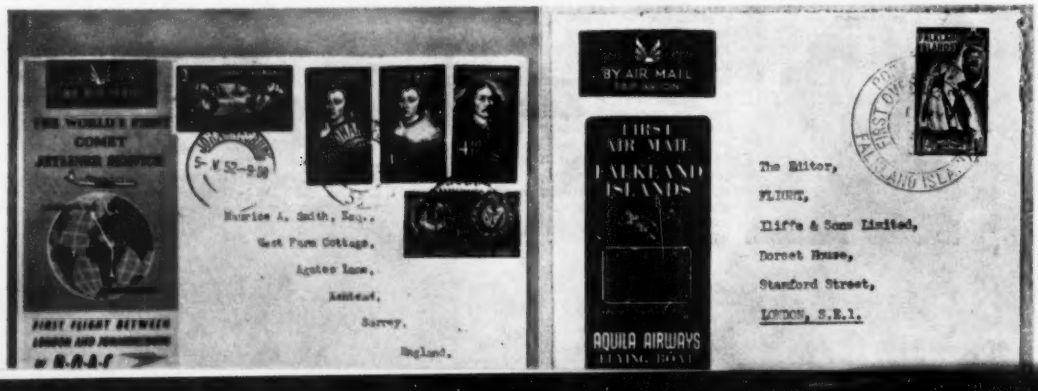
* * *

Mr. Howard R. Davies, a famous T.T. Race rider of the 1920s and founder of the H.R.D. motor cycle business, has been appointed Midlands sales manager of the Philidas (self-locking nuts) division of Whitehouse Industries, Ltd. He served in the R.F.C. during the 1914-18 war.

* * *

The associated companies Columbus, Ltd., and R. G. Dixon and Co., Ltd., of Wembley, Middlesex, specialists in industrial and other floor-cleaning equipment, have formed a single marketing organization to be known as Columbus-Dixon, Ltd.

TWO AIRMAIL COVERS of topical interest to philatelists; they commemorate (left) the first one-day service to Johannesburg by a B.O.A.C. Comet (May 2nd-3rd) and (right) the survey flight to the Falkland Islands by an Aquila Airways Hythe, which left on April 21st and returned on May 8th.



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Dakota undergoing final inspection after complete overhaul conversion at Tollerton

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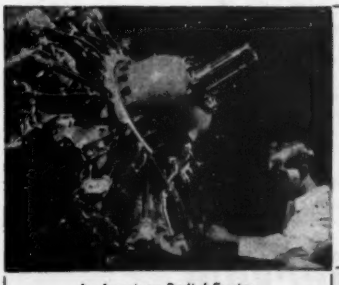

An American Radial Engine

Propeller undergoing tests at Croydon

Part of Instrument Laboratory at Bovingdon

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C

Do you know your airfields?

22

Recognise this airfield? It's No. 22 in this series of puzzle photographs. You'll find the answer below on the right. ★

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★ Portsmouth

Our American Correspondent Reports . . .

PRELIMINARY data on the activities of the American commercial operators during 1951 have now been issued by the Civil Aeronautics Board. The figures cover both passenger and cargo carriers, and both classes of traffic show percentage increases over 1950. But, as was pointed out by this column on May 2nd, so do the overall, and individual, operating expenses. The four largest freight-carriers in the States hauled over 175 million ton-miles of freight on their domestic routes, a gain of 20 per cent, and showed an increase of almost 40 per cent on their operating revenues. Operating expenses, however, rose by 32.45 per cent and preliminary figures for the first quarter of this year show an even steeper rise. This steady increase will result in a general upward revision of freight rates if the carriers are to break even, much less make a profit. However, as all surface-freight transportation costs have been going up over the last few years (another increase has just been granted the railways), the air will not be at a price disadvantage in this respect. But even if the air-freight rate rise is fairly substantial, the overall cargo business should show a continued improvement this year and most of the carriers will be using new, larger and more economical converted passenger aircraft which are now on order.

At some point, however, this use of converted passenger types is going to prevent further progress, and the enormous potential air-freight market that is becoming available will demand aircraft specifically designed for such work. It may be that several different types of freighter will be needed to cope with specialized loads, and some sort of detachable body or cargo-container—to save trans-shipment—is almost certain. The first manufacturer to be able to offer a fast and economical aircraft of this type will be in the money.

At the moment, the only new turboprop freighter known to the writer, and actually under construction, is the Lockheed project. It is a high-wing, high-tail design of some 125,000 lb all-up weight with rear-end loading, and it is being built for the United States Air Force. In drawing up the specification, Lockheed went deeply into the whole cargo problem and consulted the major freight-carriers as to their specific needs. Although their first production run will be for the military, you can bet your life that they will put this machine on to the civil market as soon as possible. Other manufacturers—such as Fairchild, Douglas, Consolidated and Boeing—must also be giving active attention to this problem, but by winning the U.S.A.F. competition, Lockheed have a start on their competitors.

* * *

IN the passenger-carrying field the domestic operators say they are happy in their work, and content with their equipment programme. But in private they must be keeping their fingers crossed and trusting that the greater economy of their new types, plus an increasing air-mindedness on the part of the travelling public—together with an increase in fares generally—will offset their ever-rising operating expenses. If these things don't happen or they can't fill the extra seats which will soon be available, it is quite possible that they may look back on 1951 with nostalgia. During last year their overall revenue ton-miles went up by 25.61 per cent, operating revenues by 25.78 and total net income by 57.68. The local service airlines did even better in their small way. Their revenue ton-miles went up 54.77 and operating revenues 26.46. Passenger traffic went up 52 per cent. This isn't surprising when one considers the great potential market there is here for the short haul inter-city airline, but it is so when one realizes how much obsolete and obsolescent equipment is in use. To exploit this market to the full the operators will need to have new and economical aircraft.

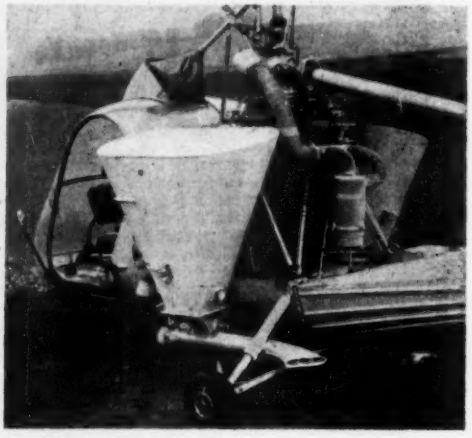
At the moment, the necessary local-service types are not available from American sources (and the general opinion is that they won't be built until some sort of Government assistance is forthcoming as an aid to the manufacturer). Back in 1946 or so the American constructors would not take the risk of building a feederline transport unless they could get firm orders—and big ones. A few played about with the idea—Boeing and Lockheed among them—but they soon abandoned the attempt under the financial stresses of the post-war period. So the local-service carriers have carried on with the aid of heavy mail subsidies. This state of affairs will continue until a suitable machine is produced in the States, or some brave character buys "foreign." At one time the de Havilland Dove looked as though it would be in the running, but there were those here who, despite its obvious economy and advantages over existing types, felt it was too small for the job. The Marathon could be a contender under the specifications which were discussed at the Society of Automotive Engineers Aviation Section meeting in New York in April, 1951, so it is a pity that—so far as one knows—no British machine of this type has visited the States. Both the Dove and the Percival Prince have been seen here and a considerable number of the former have been sold as executive transports. (*American Aviation*, for April 14th, contains an excellent article on Dove sales in the States and mentions a figure of some 42 to date.) There seems to be no reason why the Prince would not make an ideal aircraft for the small feederline and taxi-charter operators who have to haul mixed loads of passengers and freight. More than one such operator has expressed interest. Unfortunately, the introduction of a British type so far from home and on our chief competitor's door step does mean a considerable outlay in cost and time. The two major requirements would be an adequate flow of aircraft once orders had been secured and a good—and by no means small—organization to take care of repair, maintenance, overhauls (both airframe and engine) and spares. Once these are established, dollars are to be made. Those who should know these things say that there is now less buyer-resistance to British goods, and in the aviation market the impact of Canberras, Doves, Beavers, Nenes, Tays and Sapphires, and of our Flight Refuelling techniques, have served to promote a greater acceptance of British technical progress.

* * *

AT a recent meeting of the Aircraft Operators' Council in Los Angeles, Mr. E. F. Burton, chief engineer for the Santa Monica division of the Douglas Aircraft Company, made some significant remarks about runway lengths. He said, in effect, that designers must tailor their jet aircraft to existing airport dimensions, and that he was thinking in terms of 10,000ft, with take-off runs for turbine aircraft—whatever their size—of 5,500ft on a standard day and 7,000ft on a hot day. It is true that he introduced the possibility of using arrester gear (such as Grumman have installed at their airfield at Bethpage); but the extra weight and cost of such equipment is considerable and—to the writer anyhow—this seems to be tackling the problem from the wrong angle. He mentioned approach speeds of 125 m.p.h. with touchdowns at about 100 m.p.h, but admitted that higher tyre-pressures might be necessary.

All this was particularly refreshing inasmuch as certain of the American manufacturers on the West Coast, when discussing the possible increase in runway lengths for Los Angeles City and other local airfields, said flatly that runways of 15,000ft would be required for the jet transports of the future. As the impossibility of conforming to such a specification at most of the airports of the world seemed obvious (neither the land nor the money being available) it was difficult to know whether these suggestions were put forward seriously or were being made for personal or political reasons. (Many of the pilots with whom we discussed the matter at that time, however, made it clear that if they were going to be asked to fly aircraft which required such great take-off and stopping distances, then someone had another think coming.) Mr. Burton's remarks, therefore, have served to get the matter back into perspective. Whether his views are shared by other West Coast designers is not known.

At the top is an impression of the Aiglet pilot making one of his runs: the spray itself is invisible. Immediately above is a close-up view of the lime-hoppers on the Hiller, showing the ducts for blowing out the powder shaken down by an agitator in each hopper. At the left is a general view of the demonstration, with the Beaver just going into action. At the foot of the page the helicopter is seen on one of its runs.



COMPARATIVE SPRAYING

FOUR aircraft—two fixed-wing and two helicopters—took part in a recent spraying demonstration staged by Pest Control, Ltd., at Ivinghoe Beacon, Bucks. The purpose was to show the effectiveness of various methods of soil-dressing with lime, fertilizers and weed-killers and, if anything, the demonstration gained by reason of the fact that it took place in bad weather: driving rain and very poor visibility emphasized the skill of the pilots.

Lime-spreading was first carried out by ground equipment of various types, and the steeper slopes of the site were then dealt with by a Hiller helicopter specially adapted for this purpose. Its twin hoppers carried 4 cwt of lime, which was dropped from only a few feet above the ground, even on a steeply rising incline.

Another Hiller, fitted with spray booms, then flew across the slope, spraying a mixture of plant nutrient and selective weed-killer. In this case a dye was added to make the spray visible to the crowd from a distance.

Pest Control have already this season carried out a considerable amount of contract work applying these special nitrogenous and phosphatic fertilizers and, even under the adverse conditions, the accurate placement was noticeable.

Fixed-wing aircraft were then shown delivering the same solution. First an Auster Aiglet and then a de Havilland Beaver, flying at about 70 m.p.h., showed that they too could do accurate work from a low altitude and convincingly demonstrated their potentialities for hill-pasture improvement.

The Beaver operated by Pest Control, Ltd., can carry 200 gal of liquid but, in contrast to helicopters, fixed-wing aircraft require a relatively larger spraying area for maximum efficiency. Pest Control state that, with suitable fields, the helicopter is the cheaper proposition if the nearest landing place for fixed-wing aircraft is more than ten miles away.

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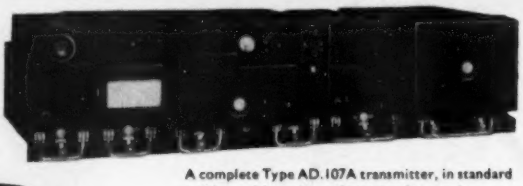
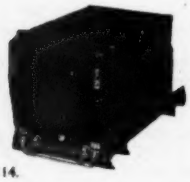


A complete Type AD.107A transmitter, in standard racking, with station voltage regulator unit.



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THE AIRLINE INDUSTRY SPEAKS

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BRITISH EUROPEAN AIRWAYS CORPORATION

From LORD DOUGLAS OF KIRTLESIDE, G.C.B., M.C., D.F.C. (Chairman)

ALTHOUGH B.E.A. already carries more passengers than any airline outside the U.S.A.—we carried 1,200,000 last year—I feel that there is still a vast potential of air traffic open to us along both our international and domestic routes. This year we shall see the beginning of tourist-class travel on our London-Paris route, and next year we should spread our wings even further, with the expected introduction of tourist-class fares on many more routes. So far we have only scratched the surface of the market: there are many hundreds of thousands of passengers, both at home and abroad, whom we shall expect to attract to air travel with tourist fares which will, in many cases, be cheaper than second-class surface travel.

Meanwhile, we in B.E.A. will press forward with our plans for introducing the Elizabethan 40/50-passenger and Discovery 40-passenger airliners just as quickly as they are delivered to us. The Elizabethan on service between London and Paris sets a new standard of comfort and speed, and with the introduction of the Discovery in October B.E.A. will be the first airline to operate turboprop aircraft. So, with these two fine British aircraft for first-class travel and with the prospect of a great increase in traffic with tourist-class Vikings and Pionairs, we look forward to expansion and prosperity.

Douglas of Kirtleside

B.E.A.'s Background.—With the passing of the Civil Aviation Act, 1946, all British scheduled airline operations became the responsibility of State airline corporations and the British European Airways Corporation was formed on August 1st, 1946, with the maintenance of British Isles services and services to Continental Europe as its allotted task.

At the end of the 1939-45 war, R.A.F. Transport Command had begun to operate essential air services to Europe, but at the beginning of 1946 these were taken over by the B.E.A. Division of B.O.A.C. until the formation of the second Corporation.

British internal services had been developed by a number of private companies and the essential services had been maintained throughout the war by some of these companies, most of which worked together as the Associated Airways Joint Committee. These operations were continued from August 1st, 1946, under charter to B.E.A., and in February, 1947, B.E.A. took over the routes, aircraft and staff of A.A.J.C. In April that year the operations of Channel Islands Airways and Allied Airways were taken over and B.E.A. became the sole operator.

B.E.A. has developed its system until today it maintains a network of British Isles services and a route system reaching over 30 centres in Continental Europe. The Corporation's operations in association with the Malta Airlines take its aircraft into North Africa to Cairo.

B.E.A. has been responsible for much pioneer work with helicopters, having been the only airline to operate regular passenger services with this type of vehicle. At present B.E.A. is operating a regular helicopter freight service between London and Birmingham.

The Corporation, in 1950, flew the first domestic and international passenger services ever to be operated by a gas-turbine powered aeroplane—the Viscount—a fleet of which will be in service next year.

The main units of the Corporation's fleet consist of 49 Vikings, 38 Pionairs (B.E.A. DC-3s), and 18 Islanders (B.E.A. D.H.89s). Twenty-one Elizabethan-class Ambassadors are in process of delivery and the type is already in regular service.

BRITISH OVERSEAS AIRWAYS CORPORATION. *From SIR MILES THOMAS, D.F.C. (Chairman)*

THE world of civil aviation is on the threshold of historic and momentous new developments. It is entering the era of faster and cheaper air transportation. By a coincidence, though not without significance, the world's first regular jet-airliner service is being inaugurated by the B.O.A.C. at the same time as the introduction this year of tourist-class travel on the busiest, most highly competitive, air route of the globe.

Many people in the aviation business are naturally wondering how these two far-reaching developments will affect airline economics. At this early stage anyone attempting to make a firm prophecy would indeed be bold. My own belief is that as jet aircraft come increasingly into use they will make profits for the operators and stimulate a steady and healthy expansion of airline traffic. I am equally sure that once tourist-class services have been launched there will be a widespread public demand for their extension to all parts of the world—a demand which airlines may not be able to meet in full for some time ahead without serious disturbance to their economics. Tourist traffic, however, has come to stay and it is well that this should be so, even if carriers must inevitably face the prospect of a decline in first-class bookings—a decline that may in some degree subside in due course, for the simple reason that on the tourist services, if they are popular, insufficient seats will be available. Moreover, there is always likely to be a substantial proportion of travellers desiring first-class accommodation and amenities.

In B.O.A.C. we envisage within a few years two all-British round-the-would routes—one encircling the Northern Hemisphere and the other going south of the Equator through Australasia. This vision (which is no pipe dream) is given reality by the technical craftsmanship of British engineers in producing the pure-jet and the turboprop engines that power the Comet Series I and Series II and the Bristol Britannia. With these two types we plan to cater not only for first-class express services but for tourist services which will girdle the earth. It is an aim that excites the imagination and inspires all our efforts.

Sometimes I am asked whether the flying-boat has a place in the future pattern of our international air routes. This is not an easy question to answer for, apart from economic considerations, much depends on the attitude of foreign airlines. At present there is no evidence that any single major carrier is inclined to operate flying-boats; nor, I feel, would other operators fly them if B.O.A.C. alone decided to reintroduce them. I remain convinced, therefore, that the problem is a national issue with an important military and strategic aspect. It would be financially impossible for us to maintain flying-boats without imposing fresh burdens on the British taxpayer.

Miles Thomas.

Whatever the future holds for British civil aviation, it is essential that the whole question of flying-boats, their survival and possible revival, should be regarded not as one which a commercial operator can, or should, be called upon to solve by itself, but as a vital matter of policy with wide national implications and responsibilities. Technically, and when viewed from the aspect of passenger psychology, the flying-boat has potential advantages that deserve very close study. Of that I am convinced.

B.O.A.C.'s Background.—The British Overseas Airways Corporation is responsible for the operation of all the British long-distance scheduled air services, and the Corporation can trace its ancestry back to the beginning of British air transport.

On April 1st, 1924, Imperial Airways was formed, as the national airline, from the four pioneer airlines: Handley Page Transport, Ltd., the Instone Air Line, Ltd., British Marine Air Navigation Co., Ltd., and the Daimler Airway, itself a direct descendant of Aircraft Transport and Travel, Ltd., the company which operated the first British air service from London to Paris, on August 25th, 1919.

The main task of Imperial Airways was the development of trunk air routes linking the United Kingdom with British territories overseas. Routes were surveyed and regular services operated to East and South Africa and to India and Australia. Feeder services were later opened to West Africa and to Hong Kong. The Empire Air Mail Programme was inaugurated in 1937 and in the same year the company began the first experimental airline flights across the North Atlantic.

On April 1st, 1940, Imperial Airways became officially merged with British Airways, which had been flying Continental services and with which I.A.L. had been working since 1939. The new organization was called the British Overseas Airways Corporation, and it began life in the difficult war period, in which it distinguished itself. Since then the Corporation has established itself as one of the world's greatest airlines and its routes stretch some 70,000 miles to all continents.

The Corporation's fleet consists of Comet, Stratocruiser, Constellation, Hermes and Argonaut passenger aircraft, and York freighters. Bristol Britannias are on order.

On May 2nd this year B.O.A.C. introduced the world's first passenger services to be flown by jet-propelled aircraft, when Comets began flying between London and Johannesburg.

In the year 1951-1952, B.O.A.C. made a profit of about £1-million—the first overall profit to be made by a British State airline.

AIR FRANCE. *From M. MAX HYMANS (President)*

AT the war's end, the resurgence of French commercial aviation involved complete reconstitution; today, Air France's route network stretches nearly 135,000 miles, and this year will again grow with the introduction of the Paris and Mexico City service [this was inaugurated on April 27th—Ed.].

With its recently delivered Lockheed Constellations helping to provide the 15 million ton-miles needed monthly for the operational programme, Air France aims this spring to increase the speed and comfort of the European services, by introducing on them four-engined DC-4 Skymasters, notably on the London-Paris, London-Nice and London-Dinard routes

Taking the Company's network as a whole, the medium- and long-distance flights operated with Constellations produce a regular increase in traffic month by month : more than 990,000 passengers were carried in 1951, compared with 775,000 in 1950. Two factors explain this rising total : first, an almost 100 per cent regularity in operation, and second, the system of direct flight connections between the European and the long-distance services at Orly Airport.

Air France is renewing its flying material over 1952 and 1953. This plan includes the purchase of 10 Lockheed Super-Constellations, 12 Vickers Viscounts, 3 de Havilland Comets, and 12 Bréguet 763 Provences. Without any doubt, 1952 will be an important date in the history of French commercial aviation, for the "democratization" of air transport will for the first time receive wide application with the introduction of tourist and second-class air travel. In actual fact, Air France, whose policy (aided by the gradual perfecting of its technical methods) has been to lower costs, and thereby fares, has already been running second-class and tourist-class services for two years, between France and French North Africa. From May 1st, in the light of the agreements concluded at the last I.A.T.A. conference, "Lafayette" tourist-class flights link the two hemispheres at fares 30 per cent lower than those for the *de luxe* flights.

Similar measures will be put into effect in Europe during the year; night services at reduced fares will be offered between Paris and London, Nice, Rome, Barcelona and Madrid, and between London and Nice, and during the summer, Air France will be able to offer its passengers 100,000 seats a month on tourist, second-class or night-flight services.

Air France, with the aid of its success in the technical field, allied to its country's national attributes in matters of comfort and cuisine, has maintained its place in the front rank of the world's airlines, and today is ready to go into service with the most modern types of airliner, offering the mass public cheap holiday travel on a scale hitherto unknown in Europe.

Air France's Background.—France has a long and magnificent history in the development of air transport, Lignes Aériennes Latécoère having begun experimental flying on the first sector of the France to South America line as early as December, 1918.

Air France was founded on August 30th, 1933, by the merging of three of the great pioneer French airlines and the purchase of a fourth—the famous Aéropostale, which opened up the routes to South America.

France built up an extensive European and Mediterranean network of services, pioneered South Atlantic and South American routes and opened long-distance services to French Africa and to the Far East.

Apart from a small system outside France, French air transport was virtually destroyed during the war, and afterwards the country's air communications had to be rebuilt almost in entirety. Air France set about this task with great energy and once more succeeded in making the French national airline rank with the world's greatest.

The present Air France network of routes, which extends throughout the world, is maintained by a fleet comprising 24 Consellations, 27 DC-4s and 34 DC-3s, and 24 Languedocs. Others on order are named above.

AIR-INDIA INTERNATIONAL

AS we close for press, the following brief message has been received from Mr. J. R. D. Tata, president of Air India International, Ltd.:—

"Air-India International are watching with a great deal of interest the progress of tourist-class travel across the Atlantic. While there is no doubt that the advent of such travel would be very welcome to the travelling public in India, at this stage it is difficult to foresee whether a fare reduction of approximately 30 per cent will create the necessary amount of new potential. The company is, however, fully alive to the likely necessity for introducing tourist-class travel between India and Europe in 1954. Plans for expansion of services have not been finalized, but it appears likely that our 749A Constellations will be used more extensively over domestic sectors connecting Bombay with other capital cities in India. Two Lockheed Super-Constellations are ordered for delivery in January-February, 1954. They will be capable of quick conversion to the following seating variations: 79-seat high-density; 60-seat normal; 'siesta' version with 47 seats."

Air-India's Background.—In October, 1932, the Aviation Department of Tata Sons began carrying air mail between Karachi, Bombay and Madras. This service connected with Imperial Airways' England-India services at Karachi.

From this small beginning Tata Air Lines became a main Indian airline which by 1938 was playing its part in the operation of the Empire air mail programme. New services were opened and following its war-time operations Tata Air Lines in 1946 became Air-India Ltd. This company played an important part in the evacuation of civilians from the Punjab in 1947 and later carried troops and ammunition to Kashmir.

When India gained independence it was decided that she must operate her own international air services, and so on March 8th, 1948, Air-India International, Ltd., was incorporated. This company is managed by Air-India which holds 51 per cent of the shares, the remaining 49 per cent of the stock being owned by the Government of India.

Air-India International began weekly services between Bombay and London on June 8th, 1948, and at present the company flies four services a week in each direction over the India-England route. In January, 1950, a new route was opened linking Bombay with Nairobi.

The company operates four L-749A Constellations.

AUSTRALIAN NATIONAL AIRWAYS. *From IVAN N. HOLYMAN (Managing Director)*

I THANK the Editor of *Flight* for giving me the opportunity of saying a few words about my company and its future.

We in Australia have been passing through a period of enormous development during the last five years, although this development has not been so spectacular as it might have been had there been no restrictions as instituted by the late Federal Government. These problems have now been largely overcome and we can plan for the future with some confidence.

We believe we will continue to increase our traffic both in passengers and freight. We do not think, in view of our low fares in relation to the rest of the world, that high-density services will develop on any large scale in this country—at least for some years to come. Mainly first-class services will be operated, but when our population substantially increases, high-density traffic may develop. Freight, however, shows the most outstanding development, and we think that only the fringe of this has yet been touched. Our company will handle 40,000 short tons this year and freight revenue represents 30 per cent of our total income. We plan to continue to develop this phase of our activities vigorously.

New aircraft are always a problem. The virtues of this or that machine require deep consideration, having in mind the cost of modern aircraft and the necessity of obtaining at least eight years' economic life. To do this we must be up to date with the latest types suitable for our conditions, and we think these will be the gas-turbine-powered airliners, six of which my company is now negotiating for in the United Kingdom. We believe that these aircraft will give a standard of comfort and speed equalling any services in the world.

A.N.A.'s Background.—Australian National Airways Pty., Ltd., is the largest airline operator in the British Commonwealth and the largest private airline in the world outside of the U.S.A., and it can trace its history back to the opening of a Fox Moth service between Launceston and Flinders Island, started by the Holyman brothers in 1932.

The present A.N.A. came into being on July 1st, 1936, as a result of the merging of Holymans Airways and Adelaide Airways, and shortly after, the new company absorbed West Australian Airways. Operations were expanded, other companies taken over and new equipment introduced—A.N.A. was the first operator of DC-2s in Australia.

During the war against Japan, A.N.A. played a distinguished rôle and with the return of peace the company endeavoured to extend its routes overseas. This desire was frustrated by the Government, but an agreement was reached with Ceylon whereby A.N.A. undertakes the operation of Air Ceylon's Ceylon-United Kingdom and Ceylon-Australia routes.

In Australia the airline operates an extensive network of routes, using a fleet consisting of six DC-4s, 28 DC-3s, two Dragon Rapides and three Bristol 170s, the last three aircraft being used mainly for the Air Beef scheme.

BRITISH COMMONWEALTH PACIFIC AIRLINES. *From G. P. N. WATT, C.B.E. (Chairman)*

THE formation of British Commonwealth Pacific Airlines, Ltd., was an example of Empire co-operation between the Governments of Australia, New Zealand and the United Kingdom. The company was formed on the basis of a partnership with capital holdings of Australia 50 per cent, New Zealand 30 per cent and United Kingdom 20 per cent, to carry the British Commonwealth flag across the Pacific along the route named in honour of its famous pioneer, Sir Charles Kingsford Smith.

This Southern Cross Route furnishes a direct air connection between Australia/New Zealand and the North American continent. Constituting a vital part of the all-British round-the-world air route, it provides a stragetic connection with the United Kingdom through English-speaking nations. In its four years of operations, B.C.P.A. has established a reputation for a safe, efficient and courteous service second to none amongst the international airlines of the world. This is a remarkable achievement in such a short period. Proof of the company's popularity with the travelling public can be found in its operating results. During the past twelve months B.C.P.A. has carried more trans-Pacific passengers than its two competitor airlines combined.

By recently approving the purchase of six de Havilland Comet IIs, the partner Governments have given concrete expression to the outstanding achievements of this young airline by enabling it to obtain the best possible equipment for its future operations.

Due for delivery in 1954, the Comet II, powered with Rolls-Royce Avon turbojets, will reduce the present flying time from Australia and New Zealand to North America by approximately ten hours. The Comet fleet will make it possible for the company to operate a daily service between Australia and North America, in addition to increased frequencies from New Zealand.

B.C.P.A.'s Background.—On September 15th, 1946, a new trans-Pacific air service was begun between Sydney (and later Auckland) and Vancouver. It was operated by Australian National Airways using DC-4s on behalf of the newly formed British Commonwealth Pacific Airlines, which, as the chairman states above, is jointly owned by the Governments of Australia, New Zealand and the United Kingdom in the proportions 50, 30 and 20 per cent.

In April, 1948, the agreement with A.N.A. terminated and B.C.P.A. took over the operation of the route, flown between Australia and Canada three times a fortnight and between New Zealand and Canada once a fortnight. Four DC-6s are used to maintain these services and sleeping accommodation is provided for every passenger without extra charge. The routing is Sydney or Auckland *via* Fiji, Canton, Honolulu and San Francisco to Vancouver.

B.C.P.A. has ordered six Avon-powered Comets for this 7,500-mile ocean service. They are due for delivery in 1954-55.

CANADIAN PACIFIC AIRLINES. *From G. W. G. McCONACHIE (President)*

TEN short years ago, Canadian Pacific Airlines was formed through the amalgamation of ten independent "bush" lines, which operated mainly between points in Canada's vast northern areas. Today, Canadian Pacific aircraft operate over 9,525 miles of domestic routes and 15,295 miles in the vast Pacific between Vancouver, the main base, and Australia, New Zealand, Japan and Hong Kong. C.P.A.L. has also stepped up its flights to Japan to take an active part in ferrying United Nations troops to Korea under government charter.

This autumn, following an established practice of providing the finest available service on all routes, Canadian Pacific will take delivery of its first 44-passenger Comet from de Havilland, followed by the first of its new Douglas Super DC-6 aircraft. With this combination, we can offer the finest services between North America and points across the South Pacific.

Canadian Pacific Airlines is indeed proud to take its place as a pioneer in the field of jet transportation operation across the Pacific. However, recognizing the trend toward tourist-class travel for those on limited budgets, it is planned to operate a high-density service between the Orient and Canada as soon as new equipment is available.

The replacement of present Pacific routes aircraft with the Comet and Super DC-6 will release several DC-4s for service on domestic routes. These will be of great use in helping to handle the increases in traffic which have been experienced on several of the lines during the past year or two. Recent large developments of natural resources and untapped power in Western Canada and in the North have made heavy demands on the capacity of Canadian Pacific Airlines in the movement of both passengers and freight to these areas. The use of DC-4s will alleviate this condition to some extent, although short landing-strips at some points restrict the use of the heavier-type aircraft.

The future of commercial aviation, in our opinion, has never been brighter. The potential market is practically unlimited.

C.P.A.'s Background.—The origins of Canadian Pacific Airlines are to be found in the small pioneer bush-flying companies which developed in Canada soon after the First World War. These companies had amassed a valuable experience of flying in Canada's northern territory, and in 1939, Canadian Pacific Airlines undertook the organization of ten of these concerns into a co-ordinated airline system.

A total of 81 aircraft of over a dozen types was taken over, with the attendant maintenance and operating problems caused by such a varied fleet. From that time C.P.A. has developed its routes and standardized its fleet, now using DC-3s, with a few Ansons, Cansos and Norseman.

The company has an unduplicated mileage of over 25,000 which includes services in Eastern and Central Canada, an extensive system from British Columbia and Alberta to the far north and two Pacific routes, one to Tokyo and Hong Kong and one to Auckland and Sydney.

C.P.A. has ordered two Comets for use on its northern Pacific route and they will cut the Vancouver-Hong Kong journey to about 20 hours.

K.L.M. (ROYAL DUTCH AIRLINES). *From DR. ALBERT PLESMAN (President)*

THE year 1952 is an important year for international civil aviation. The introduction of the tourist class on the North Atlantic air routes—50 years after Marconi established the first radio connection across the Atlantic, and 25 years after C. A. Lindbergh's famous solo crossing—may be regarded as a milestone in the history of aviation.

More and more progress will be made in this direction: cheap air transport with machines specially equipped for this kind of traffic will undoubtedly be found to meet a need. Air travel will be brought within the reach of a new cateogry of passenger. And the result will be a further large increase in the volume of air traffic, which in 1951 was already twenty times as large as in 1937. Development, however, is closely related to the international political and economic situation. In addition, it is essential that this development, which can benefit the whole world, should not be handicapped by artificial obstacles in the form of excessive restrictions in air agreements.

So far as the airlines themselves are concerned, it will be necessary to get the total operating costs down to a lower level, as these costs have hitherto made profitable operation almost impossible. There is no doubt that the prospects are favourable in the present phase of gradual expansion following the very rapid post-war growth, although large sums must be spent on new aircraft if an airline is to remain up-to-date.

At the moment K.L.M. has a number of Super Constellations, DC-6Bs, Convair 340s and a DC-6A Liftmaster on order. These modern machines, which can be fitted with turboprops at a later date, will be introduced on the Company's 118,000-mile network of air routes during the next few years.

In my opinion, jet aircraft—in whose development Great Britain has played such an admirable part—will be available for more general use by about 1958, mainly through British initiative in putting this type into service in the immediate future.

Aviation still presents many great potentialities. Let us hope and trust that they will only be used for the benefit and not for the destruction of mankind.

K.L.M.'s Background.—Royal Dutch Airlines' first route was that between Amsterdam and London, begun in May 1920, and worked in association with Britain's Aircraft Transport and Travel, Ltd.; but K.L.M.'s great reputation was built up largely as a result of its pioneer long-distance flying on the Amsterdam to Batavia route, which was opened to regular traffic on September 25th, 1930. This was then the world's longest air route and, like most of the K.L.M. routes, it was flown by the famous Fokker monoplanes.

In 1934, K.L.M. took delivery of the first Douglas DC-2 to arrive in Europe and the company achieved further publicity by flying it in to

THE AIRLINE INDUSTRY SPEAKS . . .

second place in the memorable England to Australia Air Race that year.

When the war destroyed much of K.L.M.'s organization and equipment some aircraft and crews reached the United Kingdom, and this unit maintained a regular service between the United Kingdom and Lisbon. K.L.M. also operated in the Netherlands West Indies.

K.L.M., now stronger than ever, has a route mileage of well over 100,000 in Europe, the Americas, Africa, the Far East and Australia. The fleet consists of Constellations, DC-6s, DC-4s, DC-3s and Convair-Liners. A DC-6A, DC-6Bs, Convair 340s and Super-Constellations are on order.

NORTHWEST AIRLINES. *From CROIL HUNTER (President)*

AS I am writing this brief message for your special issue, the annual reports of most of our country's commercial airlines are now being made public. The year ended December 31st, 1951, was a banner year for the airlines and revenue passenger-miles reached a figure never before attained.

However, as we enter the year 1952, we must now be fully aware of the fact that higher costs in wages, materials and taxes are already offsetting much of the financial benefit derived from this upsurge in passenger miles.

It is a matter of record, and also a matter of pride, that during this period of inflation and rising costs the airlines made available to the public a product which, unlike other items that are important in our day-to-day living, has never been allowed to increase in price. However, we must face the facts. This condition cannot long continue without resulting in a situation similar to that in which the airlines found themselves back in 1947. It is my sincere opinion that a moderate increase in fares is justified at this time to keep our airlines strong.

We are busy at this time, as many of you know, in working out the details regarding our pending merger with Capital Airlines, which we hope can be made official sometime between now and early fall. We fully believe that the merger of these two companies will develop a stronger transcontinental and international system that will render an even better service to our travelling public.

Looking into the future, I continue to feel that there will be an ever-increasing demand for high-density "coach"-type service. The American people are great travellers and our experience with "air-coach" schedules has convinced us that this type of transportation may soon account for more than half of our revenue passenger-miles.

Northwest Airlines' Background.—A mail service from Twin Cities to Chicago on October 1st, 1926, was the first flight by a Northwest Airways aircraft. In the following year a Stinson Detroiter flew the company's first passenger service over the same route, and a year later Northwest flew its first night mail service. By the end of 1933 the airline had extended its routes to Seattle on the Pacific coast.

Following the cancellation of the air mail contracts, the company was reorganized as Northwest Airlines, Inc., in 1934. In 1935 N.W.A. reopened the international route from Chicago to Winnipeg.

DC-3s were introduced in 1938 and soon after N.W.A. applied unsuccessfully for a Twin Cities to New York route in order to have a complete transcontinental system.

On June 1st, 1945, N.W.A. succeeded in opening a Milwaukee - Detroit - New York service, thus achieving their transcontinental route. They became major international carriers on July 15th, 1947, when they began regular operation to the Orient.

At present the company is operating transcontinental routes and trans-Pacific routes to Honolulu and to the Far East with a fleet of Stratocruisers, DC-4s and DC-3s. It is also undertaking the operations of Japan Air Lines.

PAN AMERICAN WORLD AIRWAYS

APART from the company's importance as a major world operator, Pan American Airways is particularly in mind at this time in view of its close association with the introduction of low-fare (tourist) services. Additionally, during the last week or two Pan American are reported to have announced something of an ultimatum—if the American industry does not produce an adequate jet aircraft soon, Pan Am will be forced to place orders for the Comet. With these thoughts in mind it is the more unfortunate that readers will not benefit from the views of Mr. Juan T. Trippe, Pan Am president, a message from whom had been expected for several weeks, but which has failed to materialize for publication alongside those of his competitors.

P.A.A.'s Background.—On October 28th, 1927, a Fokker F.VIIb/3m flew from Key West, Florida, to Havana, Cuba, thus inaugurating the first air service of Pan American Airways. Today P.A.A. is one of the world's largest airlines. It is also a purely international operator, for it has never been authorized to operate U.S. domestic services.

Routes were opened in the Caribbean area and an extensive system was built in South America. The company has from its early days amassed vast experience of over-water flying; as early as 1935 it made its first experimental flight across the Pacific from San Francisco to Honolulu. A regular mail service was begun over this route in November 1935, and passengers were carried in 1936.

In 1937, Pan American, with Imperial Airways, made a series of North Atlantic experimental flights. In May 1939, P.A.A. began regular transatlantic operations and in 1940 it opened a trans-Pacific service to New Zealand.

During the war the company undertook a vast amount of military flying throughout the world. On May 31st, 1946, the first P.A.A. aircraft (a Constellation) to arrive in London landed at Heathrow, and in June 1947 the company realized its ambition when it inaugurated round-the-world scheduled flights.

P.A.A. has an unduplicated route-mileage of over 60,000. Its Clipper fleet comprises Stratocruisers, Constellations, DC-6Bs, DC-3s, Convair-Liners and some C-46 freighters.

The company also has interests in other associate and subsidiary airlines in Central and South America, the Lebanon, and elsewhere. In 1950, P.A.A. took over American Overseas Airlines.

QANTAS EMPIRE AIRWAYS. *From W. HUDSON FYSH, D.F.C. (Chairman)*

THE history of commercial aviation has up to date been short but hectic, and it is difficult to believe that the first hesitant efforts which marked the inauguration of the air-transport age, now in full being, had their beginnings only some 32 years ago, which is within the lifetime of most of us.

Qantas Empire Airways has been one of the longest on the scene, and during the whole of its history has been greatly indebted to the assistance given in developing its services by British aircraft manufacturers. We are also indebted to the British air-transport industry, as our introduction to international air transport came in 1934 through the co-operation of Imperial Airways in the George Woods Humphery era, and this continues today in parallel partnership with B.O.A.C. in the Miles Thomas era.

As Australia's International Airline, Q.E.A. is preparing to take its part in the greatly expanded sphere of air transport which lies ahead. High-density traffic must be catered for and a hand taken in the development of jet types.

The principal new service to be operated by Q.E.A. in 1952 will link Australia and South Africa, involving a flight-stage of 2,677 miles across the Indian Ocean between Cocos Island and Mauritius. This is one reason why my company favours long-range aircraft; another is that we suffered the lesson of having our Sydney-London route broken in 1942 by the Japanese in Indonesia and Malaya.

Choice of replacement types of aircraft has been complicated by the virtual revolution caused by the introduction of jets, and this is, of course, further complicated by the rival claims made by the protagonists of the turbojet and turboprop types of airliner.

It is obvious that on the Kangaroo Route between England and Australia—where there is a heavy mail and freight demand—the high-speed, low-volumetric Comet can only be operated in conjunction with larger long-range types which can also cater for the coming so-called tourist-class traffic, and Q.E.A. is desirous of adopting the same policy as its "partner," B.O.A.C., in this respect.

Delivery timings are important; thus Q.E.A. has ordered the Super Constellation 1049C type, which it is felt will make an exceedingly valuable contribution on the Kangaroo Route. Further orders for aircraft depend on type developments, coupled with delivery dates.

Q.E.A. share the view of other operators that the development of air transport will ultimately result in cargo loadings exceeding the figures for mails and passengers, but this depends greatly on the production of a cargo carrier operable at an acceptable cost per C.T.M. to our business clients, and the production of such a type is one of the major jobs of today.

Qantas Empire Airways' Background.—The history of Qantas Empire Airways goes back to 1920, when, on November 16th, Queensland and Northern Territory Aerial Services, Ltd. (Q.A.N.T.A.S.), was registered. This company undertook joy-riding and taxi work at first but on November 2nd, 1922, began to operate a regular service between Charleville and Cloncurry *via* Longreach.

Qantas built up its operations in the territories incorporated in its name, and in April 1931 the company took part in the first Australia to England experimental air mail flight.

On January 18th, 1934, Qantas Empire Airways, Ltd., was formed to combine the interests of Qantas and Imperial Airways in readiness for the opening of the regular England to Australia air service which began at the end of that year.

Qantas had a magnificent war record. Perhaps its greatest wartime achievement was the reopening of England to Australia air communication by the operation of its Indian Ocean route from Australia to Ceylon.

Today Qantas Empire Airways, now completely Australian, has over 20,000 miles of routes in Australia, between Australia and New Guinea and other islands and to Britain, Hong Kong and Japan. The company has surveyed an Indian Ocean route linking Australia with South Africa and it will operate regular services over this important route.

The fleet consists of Constellations, DC-4s and DC-3s, Drovers and some smaller land aircraft and a number of flying-boats. It has on order some Super-Constellations. The company's "Kangaroo" route between Australia and the United Kingdom is worked in association with British Overseas Airways Corporation.

SABENA. *From M. GILBERT PERIER (President)*

CONSIDERING the 33 million ton-miles transported in 1951, the position of the SABENA seems to correspond pretty well to the economic importance of Belgium and to the passenger traffic and freight shipments moving in and out of the country.

The policy of this company for the years to come will be to continue to pursue, as closely as possible, the growth of this traffic which has, for the last years, maintained a steady annual increase of approximately 20 per cent.

Today, the permanent problem of being adequately equipped to meet requirements is complicated by the perplexing choice between jet, turboprop and piston-engine craft. Indeed, each month spent in considering the matter means two or three months wasted as far as delivery dates are concerned. In addition, every air carrier is going all out for experimental high-density services and reduced rates right in the midst of an international inflationary period; it is, therefore, quite understandable that any well-meaning board of directors should number a soothsayer amid its members. No member of my board having this divine power, I am limited to giving here a few indications regarding the present and the immediate future of this company.

Our services are divided into four sectors which are, in order of importance : Brussels-Congo, North Atlantic, Europe to the Middle East and the "domestic" Congo lines. These services represented respectively 38, 29, 21 and 12 per cent of our activity during the year 1951. The figures show that only half our work assumes a really international aspect, the other half coming under the definition of "cabotage imperial" or of just plain "cabotage."

Another characteristic of our operations is the relatively small share shown in the transportation of mail (4.39 per cent in 1951) and the relatively important share of freight carried (36.84 per cent in 1951), leaving only 58.77 per cent of the total to passenger traffic.

Our programme for 1953 and 1954 includes very important developments due to the operating of another eight DC-6B aircraft (six in 1953 and two in 1954) in addition to the six existing DC-6s, which will represent, more or less, 30 million extra ton-miles available as compared with 1952. The distribution of this extension has not, as yet, been settled definitely; it will probably cover : (1) an increase of the Brussels-Congo services which will be brought up to a frequency of 11 weekly passenger services *via* Rome, Tripoli, Casablanca, Lisbon or Cairo, as the case may be, plus three weekly freight services; (2) seven weekly passenger services between New York and Brussels, as compared with six in the summer of 1952, as well as a weekly cargo service; (3) the proposed operation of a Brussels-Bombay service; and (4) the introduction of tourist-class high-density services in Europe and possibly the Middle East.

These, roughly, are the future plans which are at present being considered. The final results may possibly turn out to be quite different.

SABENA's Background.—Belgian air transport was initiated by S.N.E.T.A., which opened services from Brussels to London and Paris in 1920 and which, following a series of surveys in the Belgian Congo, opened the world's first colonial airline on July 1st, 1920, with a service between Leopoldville and N'Gombé.

Having accomplished its task of study and experiment, S.N.E.T.A. appointed a successor—the Société Anonyme Belge d'Exploitation de la Navigation Aérienne (SABENA) which is still the Belgian national airline.

SABENA opened up a European network and also a system of internal services in the Congo, and on February 23rd, 1935, a regular service was established between Belgium and the Congo, thereby linking the two systems.

During the war the company evacuated as much equipment as possible to the Congo, where it was placed at the service of the Allies.

After the war SABENA rebuilt its European routes and reopened its services linking Europe and Africa. The company now operates over 30,000 miles of routes in Europe, to and in Africa and between Belgium and the United States. The fleet consists of Douglas DC-6s, DC-4s, DC-3s and Convair-Liners and DC-6Bs are on order. SABENA also operates a helicopter mail service in Belgium with Bell 47s.

SCANDINAVIAN AIRLINES SYSTEM. *From PER A. NORLIN (President)*

LET me state right away that I believe there is room and need for both first-class and high-density or "tourist" services, but that tourist services (partly through diversion from first-class service but, I hope, mainly through exploration of entirely new markets) will gradually grow into the most important part of our operations. The success of this development depends, however, to some degree upon how we approach the matter from the very beginning.

Technical development over the last years has enabled the airlines to maintain a fairly stable fare-level in a period of generally rapidly increasing prices. There are now many indications that costs are catching up with us and that for at least some years to come the increase in operating expenses will not be fully offset by increased productivity. It is urgent, therefore, that air fares are as soon as possible brought into reasonable relationship with general economic conditions. I believe that the market, if aggressively sold, can bear an increase in fares.

With regard to the tourist service we must not be blinded by the very heavy demand that apparently exists for low-priced air transportation. We must carefully investigate to what extent we can profitably satisfy this demand with the equipment that we have today or can obtain within a reasonably short time, and whether our costs actually permit us to operate at prices low enough to attract the market. When evaluating this, we should not overlook the very real possibility that in a few years the service that we offer the passengers on our tourist aircraft may well, for competitive reasons, be of the same quality as the service at present offered on the standard class.

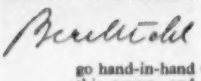
While there is no disagreement as to the necessity for tourist services there is some variety of opinion as to when and how fast they should be introduced. In the airline industry we cannot afford too-costly experiments. It would be best for all concerned to go slowly and make sure of a sound foundation.

S.A.S.'s Background.—An agreement signed in July 1946 brought the Scandinavian Airlines system into being for the operation of the transatlantic services of Danish, Norwegian and Swedish Air Lines. This experiment was so successful that in February 1948 it was decided to extend the merger to include the European routes of the three companies, D.D.L., D.N.L. and A.B.A.

In 1951 the three companies signed a 25-year agreement, back-dated to October 1st, 1950, forming a consortium to have a single board of directors and one management. All aircraft are now owned by the consortium and the former constituent companies were transformed into non-active holding companies. The national holdings in S.A.S. are 3/7ths Swedish Air Lines and 2/7ths each Danish and Norwegian AirLines.

S.A.S. now operates over 30,000 miles of routes in Europe, to North and South America, Central Africa and the Far East. The present fleet consists of 12 DC-6s, nine DC-4s, six Saab Scandias, 25 DC-3s and two Junkers Ju 52/3m floatplanes.

Douglas DC-6Bs are to go into service on North Atlantic tourist-class flights on May 24th. The Sandringham flying-boats which had until this year worked the Oslo-Tromsö route, have been withdrawn and for the first time landplanes are used as far north as Bodö.



SWISSAIR. *From DR. W. BERCHTOLD (Chairman)*

PARTICIPATION in peaceful world air traffic does not, for Switzerland, involve the question of prestige. It is more simply the adherence to the policy of being present in order to further the many commercial, spiritual, touristic and cultural interests with other friendly nations of the world. In fact, Switzerland wants, as in so many other fields, to retain her independence on the highways of the skies.

Swissair, the national—but not nationalized—airline of Switzerland, has in the last few years made special efforts to reach this goal. In sending its aeroplanes over the boundaries of Europe to Cairo, Basrah, Lydda, Istanbul and New York the company has increased the number of ton-miles offered from 14,916,097 in 1949 to 25,481,666 in 1952.

It is only natural that such a growth can only go hand-in-hand with an increase in the number of aircraft. For this reason, and in conjunction with an adequate judgment of future tasks, Swissair last year ordered four more Douglas DC-6Bs. Thus the company will have at the end of 1953 a fleet of six aircraft of this most modern type, two of which are already employed on the North Atlantic between Switzerland and New York. This should not only allow to build and improve still further the trans-atlantic service, but should also permit an extension of Swissair's intercontinental network.

But the problem of augmenting and renewing equipment is also closely connected with the introduction of the tourist class over the North Atlantic as well as with certain similar tendencies in Europe. There is no doubt that the tourist class represents a natural evolution which may be compared with the developments that have taken place previously in the other fields of transport. By making air travel cheaper it is, at the same time, possible to win a new potential of customers. For these reasons it would be futile to oppose the introduction of the tourist class in Europe. This will, however, force Swissair to tackle some rather difficult problems. As the company has only a limited number of aircraft it cannot, in contrast to other and more important air carriers, utilize part of its flying material for tourist services only. It will, therefore, have to find a compromise solution by way of which it can use its aircraft for tourist class as well as for first class.

The possibility was examined of increasing the number of Convair-Liners. Today, however, the question has been raised whether it would not be more advantageous to have more DC-6Bs which can be equally well used for both long and medium distances. For short-distance flights the DC-3 can still render excellent services.

Swissair's Background.—Air transport in Switzerland began in 1919 when Ad Astra Aero A.G. was formed as the first Swiss air transport company, which did much to establish Swiss air transport. On March 26th, 1931, it amalgamated with "Balair" to form the present Swissair.

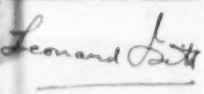
The new company extended its routes and introduced faster schedules. As early as 1933 the company introduced the first modern low-wing transport monoplanes—Lockheed Orions—with retractable undercarriages to be used on European air services.

Swissair was one of the first European operators of the DC-2, introducing it on its service to London in 1935, and it became one of the only two airlines to use diesel-powered aircraft when, in 1936, it placed a Jumo-powered Ju86 in service. DC-3s were introduced in 1937, and when peace returned to Europe Swissair acquired DC-4s, with which it started long-distance operations, including transatlantic services.

In 1949 a fleet of Convair-Liners was introduced on the European routes, and in 1951 the company began to operate DC-6Bs over the North Atlantic.

Swissair now has an unduplicated route mileage of over 20,000 and a fleet comprising three DC-6Bs, two DC-4s, four Convair-Liners, and 15 DC-3s. Three more DC-6Bs are due for delivery next year.

TASMAN EMPIRE AIRWAYS. *From SIR LEONARD ISITT, K.B.E. (Chairman)*



IN the operation of air routes extending over some 8,000 route-miles in the South Pacific, TEAL (a New Zealand, Australian and United Kingdom Government enterprise) has, since the company commenced operation in 1940, relied almost entirely on flying-boats, which are almost perfectly suited to present airport conditions in the area. Solents fly all except one of TEAL's routes—the Christchurch-Melbourne service, which is operated by Skymaster aircraft. The company intends removing the Solents from high-density traffic routes across the Tasman Sea within five years, although they will probably continue to fly to island territories, many of which have no well-developed landplane airports.

In choosing the next TEAL aircraft, airport facilities have been a difficult problem. Another primary consideration has been the peculiar traffic conditions in the territories covered. TEAL has probably already set the standard for the local future with its luxury-style service at fares which are, by European or American standards, tourist-class. For return ticket-holders the average rate per mile on single-stage flights of 1,300 miles and more is 5.07d sterling. In addition to complying with route conditions and some stringent economic requirements, replacement aircraft will have to be of a type on which acceptable service can be provided at tourist-class fares. The company is interested in the Bristol Britannia, but will make no firm decision until that aircraft flies this year. If it fulfils expectations, it should meet our needs admirably.

Subject to rapid improvement of New Zealand airport facilities, the Britannia looks very much like the future trans-Tasman aircraft, but other TEAL routes must continue to be served by flying-boats for some years. The isolated Chatham Islands have no land airport and there is no prospect of the territory being able to afford one. At Fiji, the international land airport is located at Nandi, about 110 miles distant from the capital city of Suva. At Tahiti there is no land airport. Hence the intention to continue utilizing Solents among the island territories, which are of considerable economic and national importance to New Zealand and its international airline, TEAL.

Tasman Empire Airways' Background.—Representatives of the Government of the United Kingdom, the Commonwealth of Australia and New Zealand at a conference in London in 1938 decided that a contract for the operation of a trans-Tasman air service should be granted to a new company formed by Imperial Airways, Qantas Empire Airways and Union Airways of New Zealand. This company was formed as Tasman Empire Airways, Ltd., and the share capital is held 50 per cent by New Zealand, 30 per cent by Australia, and 20 per cent by the United Kingdom.

Tasman Empire Airways began services between New Zealand and Australia with Short C-class flying-boats in 1940, and today the company maintains a network of routes linking New Zealand with Australia, Fiji and Chatham Island. Short Solent flying-boats are used on all services except those between Christchurch and Melbourne, where DC-4s are used.

For some periods Tasman Empire Airways has had the distinction of maintaining the only communication between New Zealand and Australia.

TRANS-CANADA AIR LINES. *From G. R. McGREGOR (President)*

THE purchase of additional piston-engined aircraft by TCA reflects our opinion that the development of both turboprop and turbojet engines (although we are certain that one or the other, or both, are bound to come) has not yet reached a point where an airline can embark with economic confidence on a major programme of fleet replacement with aircraft having one or other of the new types of power. Airlines which are in a position to make experiment on a relatively small scale are performing a service for the industry.

Lower fares which have been associated with high-density seating unquestionably make available to the airlines a new and very much larger market, but it remains to be seen whether or not the additional revenue to be derived from high-density operations can offset both the reduction in unit fares and a generally upward trend in airline operating costs. The experience of I.A.T.A. carriers on the North Atlantic during the coming twelve months should do much to provide an answer to this moot question.

T.C.A.'s Background.—Fifteen years ago an airline across Canada was only an ideal still to be realized when the company was formed with $5 million capital, 51 per cent held by Canadian National Railways.

By the end of 1937 T.C.A. was operating its first passenger and mail

service—between Vancouver and Seattle. At the end of 1938 the company was carrying mail between Vancouver and Montreal. On April 1st, 1939, the first Montreal-Vancouver passenger service began, and in the following year the trans-continental route was completed with the opening of a route from Montreal to Moncton in New Brunswick.

In July, 1943, at the request of the Canadian Government, T.C.A. began a transatlantic service between Montreal and Britain for the carriage of priority passengers, forces mail and freight. On May 1st, 1947, the North Atlantic services became a fully commercial operation with the introduction of the North Star Canadair Fours.

T.C.A. now has 17,000 miles of routes in Canada, to Europe, the U.S.A., Bermuda and the Carribean. The trunk routes are operated with 23 North Stars, while DC-3s serve the secondary routes. Five Super-Constellations are on order for the transatlantic services.

TRANS WORLD AIRLINES. *From RALPH S. DAMON (President)*

THIS is another period of change for commercial aviation, a young and historically fast-changing industry. As scheduled international airlines continue to plan an ever-increasing role in the economic and sociological strengthening of the free world, the entire concept of air travel is undergoing a revision.

Tourist fares transatlantically, which commenced on May 1st, have broken down the last possible barrier to overseas air travel by bringing it within the means and the feasibility of virtually everyone. Inauguration of this transatlantic service is a logical milestone in Trans World Airlines' pioneering efforts to bring air travel to the mass market.

More than three years ago TWA became the first schedule trans-continental airline to offer air transportation at greatly reduced rates. Today, the trans-continental figure has been slashed to $99 in 81-passenger Constellations. As the most experienced trans-continental economy-fare operator, TWA has flown more than 600,000,000 passenger-miles and carried nearly half a million passengers on this type of service.

Well before its successful advocacy of the basic $270 transatlantic tourist fare now going into effect, TWA had pressed for an economy-type international service. Through the company's efforts, special winter "thrift season" rates have been in effect transatlantically for the past three years.

Certainly TWA is experiencing a record demand for the "Sky Tourist" service to Europe. Our present seven round-trip flights weekly in this new overseas service will be increased to 12 next month, and possibly to twice daily during the summer months. That is a measure of the demand.

There is no question but what tourist service—operated by TWA, for example, in the same Constellations as flown in our standard and *de luxe* "Ambassador" schedules—will be offered by all of the scheduled airlines on an ever-increasing basis, both domestically and internationally. None the less, there is and always will be a proportionate demand for first-class air transportation.

In addition to Constellations—of which TWA has a fleet of 66—we are operating Martin 4-O-4s, and both the Martin 4-O-4 and the Super Constellation are designed for conversion to turboprop power when these new engines become available. However, for the next several years, TWA's plans are integrally woven about the dependable, efficient and adaptable piston-engine Constellation.

Because of this, as well as the fact that the fast-growing tourist market accents capacity rather than unusual speed, I am sure TWA will find that its present type of equipment will suit the demands of the air-travelling public adequately for years to come.

R.S. Damon

Trans World Airlines' Background.—The original T.W.A.—Transcontinental and Western Air Inc.—was formed on October 1st, 1930, by the merger of Western Air Express (which had begun regular Los Angeles to Salt Lake City services in 1926) and Transcontinental Air Transport, which had itself already obtained control of Maddux Air Lines.

T.A.T. had operated the first U.S. coast-to-coast passenger service with aircraft on day stages and passengers transferring to the railways for the night sectors. Twenty-five days after its formation T.W.A. began an all-air transcontinental service with one night stop. By 1932 T.W.A. was operating a passenger and mail coast-to-coast service in 24 hours.

T.W.A. has had a big influence on transport aircraft design, having worked with Douglas on the production of the DC-1, which led to the DC-2 introduced by T.W.A. in 1934—thereby cutting the transcontinental schedules to under 16 hours. The company became the first domestic operator anywhere to use pressurized aircraft when it introduced the Boeing Stratoliner in 1940. T.W.A. collaborated with Lockheed in the design and production of the Constellation which now forms the backbone of a T.W.A. fleet serving 16,000 miles of routes which stretch from California to India.

A fleet of Martin 4-0-4s is being commissioned for domestic operation and T.W.A. will introduce a fleet of Super-Constellations this year.

BRITISH INDEPENDENT OPERATORS

THE British companies listed on this page are among the better known of those engaged in the operation of regular scheduled passenger or freight services operated under Associate Agreements with B.E.A. or B.O.A.C., or are engaged on regular transport under Government contract. They also undertake other classes of work. The fleets shown are those used on scheduled operations.

In addition, a number of British companies are engaged in the operation of air tours (under Associate Agreements) non-scheduled passenger and freight carrying, joy-riding, air photography and survey, crop dusting and spraying, etc.

Air Enterprises, Ltd., Croydon Airport, Surrey. Scheduled services between London and the Isle of Wight (in association with B.E.A.). Fleet: D.H. Rapides.

Air Kruise (Kent), Ltd., Lympne Airport, Kent. Scheduled services between Lympne and Le Touquet and Ostend (in association with B.E.A.). Fleet: D.H. Rapides.

Airlinks (Jersey), Ltd., 4 The Parade, St. Helier, Jersey, C.I. Scheduled services from the Channel Islands to England and France (in association with B.E.A.). Fleet: D.H. Rapides.

Airwork, Ltd., 15 Chesterfield Street, London, W.1. Operating leave services between the United Kingdom and Khartoum on behalf of the Sudan Government, and other leave services in the Mediterranean area. Fleet: Vickers-Armstrongs Vikings and Douglas DC-3s. Five Handley Page Hermes IVs to enter service shortly.

Aquila Airways, Ltd., 6 Curzon Place, Park Lane, London, W.1. Scheduled flying-boat services between Southampton and Madeira and Lisbon and Madeira, and from Madeira to Las Palmas (in association with B.O.A.C.). New route Southampton-Marseilles due to begin May 17th (in association with B.E.A.). Fleet: Short Solent and Hythes.

Birkett Air Service, Ltd., 237, Acton Lane, London, W.4. Scheduled services between Croydon and the Channel Islands and Croydon and France (in association with B.E.A.). Fleet: D.H. Rapides.

Cambrian Air Services, Ltd., The Airport, Cardiff, Glam. Scheduled services between Liverpool, Cardiff, Southampton and the Channel Islands; and Cardiff, Haverfordwest and Bristol (in association with B.E.A.). Fleet: D.H. Rapides.

Don Everall (Aviation), Ltd., Elmdon Airport, Birmingham, Warwickshire. Scheduled services from the Channel Islands to Birmingham (in association with B.E.A.). Fleet: D.H. Rapides.

Eagle Aviation, Ltd., 29, Clarges Street, London, W.1. Operating services between United Kingdom and Livingstone and Bulawayo for the Air Ministry. Fleet: 4 Avro Yorks.

East Anglian Flying Services, Ltd., Southend Airport, Essex. Scheduled services between England and France (in association with B.E.A.). Fleet: D.H. Rapides.

Fingland's Airways, Ltd., 261, Wilmslow Road, Rusholme, Manchester, Lancs. Scheduled services between Manchester and Newquay (in association with B.E.A.). Fleet: Avro Anson.

Hunting Air Transport, Ltd., 52, Pall Mall, London, S.W.1. Operating Government services for military personnel between Malta and Gibraltar. Fleet: 7 Vickers-Armstrongs Vikings.

Isle of Wight Flying Club, Ltd., Lea Airport, Sandown, Isle of Wight. Scheduled services from Sandown to Portsmouth, Southampton and Bournemouth (in association with B.E.A.). Fleet: D.H. Rapide and Miles Gemini.

Lancashire Aircraft Corporation Ltd., Salmesbury Airfield, near Blackburn, Lancs. Scheduled services between Blackpool, Leeds, Bradford, Birmingham and the Isle of Man; and Leeds, Bradford and Jersey (in association with B.E.A.). Fleet: Douglas DC-3s, Airspeed Consuls, D.H. Rapides and D.H.86B.

Manx Air Charters, Ltd., Ronaldsway Airport, Ballasalla, Isle of Man. Scheduled services between Isle of Man and Carlisle (in association with B.E.A.). Fleet: D.H. Rapides.

Morton Air Services, Ltd., Croydon Airport, Surrey. Scheduled services between Croydon and the Channel Islands; Croydon and Le Touquet; and Bristol and the Channel Islands (in association with B.E.A.). Fleet: D.H. Rapides, D.H. Doves and Airspeed Consuls.

Murray Chown Aviation, Ltd., Staverton Airfield, Cheltenham, Glos. Scheduled services from Cheltenham to Bournemouth and Jersey; and between Newquay and the Scilly Isles (in association with B.E.A.). Fleet: D.H. Rapides.

Olley Air Service, Ltd., Croydon Airport, Surrey. Scheduled services from Croydon to the Channel Islands (in association with B.E.A.). Fleet: D.H. Rapides, D.H. Doves, and Airspeed Consuls.

Scottish Airlines (Scottish Aviation, Ltd.), Prestwick Aerodrome, Prestwick, Ayrshire. Scheduled services between Prestwick and Northolt via Burtonwood, and between Prestwick and the Isle of Man (in association with B.E.A.). Fleet: 4 Douglas DC-3s, 2 D.H. Rapides, and 1 Airspeed Oxford.

Silver City Airways, Ltd., 1, Great Cumberland Place, London, W.1. Scheduled car and other vehicles services from Lympne to Le Touquet; Southampton to Cherbourg; and Southend to Ostend (in association with B.E.A.). Fleet: 9 Bristol 170s.

Starways, Ltd., Liverpool Airport, Speke, Liverpool, Lancs. Services between West Hartlepool, Jersey, Isle of Man and Glasgow; and Liverpool to Isle of Man (in association with B.E.A.). Fleet: Douglas DC-3s, D.H. Rapides, and Avro Ansons.

Transair, Ltd., 7-8, Great Winchester Street, London, E.C.2. Scheduled services from Croydon to the Channel Islands (in association with B.E.A.), newspaper services and flights to race meetings. Fleet: Avro Ansons.

THE WORLD'S AIRLINES

A Directory of Operators and their Fleets

THE names, headquarters, routes and equipment detailed here cover all known operators of regular scheduled passenger services based on the latest available information. Operators of non-scheduled or freight or mail-only services are not included. An asterisk indicates that the company mentioned is a member of I.A.T.A., while a dagger indicates associate membership. Route mileage is shown to the nearest 500 miles for companies operating 500 or more miles of unduplicated routes. The full fleet is not always shown, only aircraft normally used on scheduled services being listed. British "independent" companies are listed on page 591.

Aden Airways, Ltd., Aden (owned by B.O.A.C.). Routes: Local and to Ethiopia, East Africa, Sudan, Egypt, Saudi Arabia and Syria; mileage 6,000. Fleet: 6 Douglas DC-3s.

Aer Lingus Teoranta,* Dublin, Eire (Associate of B.E.A. and B.O.A.C.). Routes: Domestic and to the United Kingdom, France and Netherlands. Fleet: 13 Douglas DC-3s; 4 Bristol 170s being delivered; 4 Vickers-Armstrongs Viscounts on order.

Aero O/Y (Finnish Air Lines),* Helsinki, Finland (the Finnish national airline). Routes: Domestic and to Denmark, Germany and Sweden; mileage 3,000. Fleet: 8 Douglas DC-3s.

Aero Africaine (Société Africaine des Transports Tropicaux), Algiers, Algeria. Routes: To France, French West Africa and French Equatorial Africa. Fleet: Douglas DC-3s and Lockheed Lodestars.

Aero Geral, Ltda., Rio de Janeiro, Brazil. Routes: Domestic; mileage 1,500. Fleet: 4 Douglas DC-3s and 4 Convair Cansos.

Aeroflot (Grazdanskij Wozdusznyj Flot), Moscow, U.S.S.R. (the Soviet national airline). Routes: Domestic and to Austria, Bulgaria, China, Czechoslovakia, Finland, Germany, Hungary, Iran, Poland and Rumania; mileage 50,000. Fleet: IL 12s, LI 2s (Soviet DC-3s) and smaller types.

Aerolineas Argentinas (Argentine Airlines),* Buenos Aires, Argentina (the Argentine national airline). Routes: Domestic and to Chile, Cuba, Europe and U.S.A.; mileage 35,500. Fleet: 6 Douglas DC-6s, 6 DC-4s, 26 DC-3s, 5 Convair-Liners and 5 Short Sandringhams.

Aeronaves de Mexico, S.A., Mexico City, Mexico. Routes: Domestic; mileage 2,000. Fleet: Douglas DC-4s and DC-3s.

Aeronorte (Empresa de Transportes Aéreos Norte do Brasil, Ltda.), São Luiz, Brazil. Routes: In Northern Brazil. Fleet: 4 Percival Princes.

Aero Portuguesa, Ltda.,* Lisbon, Portugal. Routes: Lisbon to Tangier and Casablanca; mileage 1,000. Fleet: Douglas DC-3s.

Aerovias Brasil (Empresa de Transportes Aeroviás Brasil, S.A.), Rio de Janeiro, Brazil. Routes: Domestic and to Dominican Republic, Trinidad, Miami and Venezuela; mileage 13,000. Fleet: 4 Douglas DC-4s and 21 DC-3s.

Aerovias Equatorianas, C.A., Quito, Ecuador. Routes: Domestic and to Miami. Fleet: Boeing Stratoliners and Douglas DC-3s.

Aerovias Guest, S.A.,* Mexico City, Mexico. Routes: Mexico to Miami; mileage 1,000. Fleet: 4 Douglas DC-4s.

Aerovias "Q," S.A., Havana, Cuba. Routes: Domestic and to Florida; mileage 500. Fleet: 6 Douglas DC-3s and 2 Curtiss Commandos.

Aerovias Reforma, S.A., Mexico City, Mexico. Routes: Domestic; mileage 3,000. Fleet: 5 Douglas DC-3s.

Aerovias Transcontinentales, S.A., Mexico City, Mexico. Routes: Domestic. Fleet: Douglas DC-3s.

Aigle Azur, Paris, France. Routes: France to Tunis and Morocco; French West Africa, French Equatorial Africa and French Indo-China. Fleet: 3 Boeing Stratoliners and 12 Douglas DC-3s.

Air Algerie, Algiers, Algeria. Routes: Domestic and to France, Majorca and Switzerland; mileage 1,000. Fleet: 1 Breguet 761, 3 S.N.C.A.S.O. Bretagne and 11 Douglas DC-3s.

Air Atlas, Casablanca, Morocco. Routes: Domestic and to France; mileage over 2,000. Fleet: 5 Douglas DC-3s and 2 S.N.C.A.S.E. Languedoc.

Air Ceylon, Ltd.,* Colombo, Ceylon. Routes: Domestic and to India. Ceylon-Europe and Ceylon-Australia services operated by Australian National Airways (which has holding in Air Ceylon); mileage 12,500. Fleet: 3 Douglas DC-3s; 2 DC-4s operated by A.N.A.

Air France (Compagnie Nationale Air France).*—See page 586.

Air-India, Ltd., Bombay, India. Routes: Domestic and to Ceylon and Pakistan; mileage 4,000. Fleet: 7 Vickers-Armstrong Vikings, 12 Douglas DC-3s and 1 Douglas DC-4.

Air-India International, Ltd.*—See page 586.

Air Jordan, Amman, Jordan. Routes: To Cyprus, Egypt and the Lebanon. Fleet: 2 D.H. Doves and Airspeed Consuls.

Air Liban,* Beirut, Lebanon (successor to Compagnie Générale de Transports—C.G. de T.). Routes: Lebanon to Cyprus, Egypt, Iraq, Jordan, Persian Gulf, Saudi Arabia and Syria; mileage 3,000. Fleet: 3 Douglas DC-3s and 1 S.N.C.A.S.E. Languedoc.

Air Maroc, Paris, France. Routes: Morocco to France, Germany and Switzerland; mileage 2,000. Fleet: 6 Douglas DC-3s, 4 Curtiss Commandos, 3 S.N.C.A.S.O. Bretagne and 1 S.N.C.A.S.O. Corse.

Air Services of India, Ltd., Bombay, India. Routes: Domestic; mileage 2,000. Fleet: 8 Douglas DC-3s and 2 S.N.C.A.S.O. Corse II.

Air Vietnam, Saigon, French Indo-China. Routes: Domestic and to Hongkong and Thailand; mileage 2,000. Fleet: 4 Douglas DC-3s, DC-4s and 3 Bristol 170s (chartered from Air France).

Airlines (W.A.), Ltd., Perth, Western Australia. Routes: In Western Australia; mileage 4,500. Fleet: 3 D.H. Doves and 2 Avro Ansons.

Airways (India), Ltd., Calcutta, India. Routes: Domestic; mileage 3,000. Fleet: 8 Douglas DC-3s.

A.L.A.S.A. (Aerovias Latino Americanas, S.A.), Tabasco, Mexico. Routes: Domestic; mileage 500. Fleet: 1 Douglas DC-3.

Alaska Airlines, Inc., Anchorage, Alaska. Routes: Domestic and to the United States. Fleet: Douglas DC-4s, DC-3s and other types.

Alaska Coastal Airlines, Juneau, Alaska. Routes: Local. Fleet: Grumman Gray Geese.

Alaska Island Airlines, Petersburg, Alaska. Routes: Domestic. Fleet: Grumman Widgeon and Wacos.

Alitalia (Aerolinee Italiane Internazionale), Rome, Italy (an associate of B.E.A.). Routes: To Malta and Tripoli, Greece and the Lebanon, East Africa and South America. Fleet: 4 Douglas DC-4s and 1 DC-3 (chartered from LAI).

All-American Airways, Inc., Washington D.C., U.S.A. Feederline with routes in the Eastern States. Fleet: 11 Douglas DC-3s.

Alpes-Provence (Société de Transports Aériens Alpes-Provence), Marseilles, France. Routes: To Djibouti and Bangui. Fleet: Douglas DC-3s and Convair Liberators.

American Airlines, Inc.,* New York City, N.Y., U.S.A. Routes: Domestic and to Canada and Mexico; mileage 8,000. Fleet: Douglas DC-6s, DC-6Bs, DC-4s and Convair-Liners; 25 DC-7s on order.

Ansett Airways, Pty., Ltd., Melbourne, Victoria, Australia. Routes: Local and to Brisbane, Sydney and Tasmania; mileage 2,500. Fleet: 5 Douglas DC-3s.

Arab Airways Association, Ltd., Amman, Jordan. Routes: To Egypt and the Lebanon; mileage 500. Fleet: D.H. Dragon Rapides and Airspeed Consuls.

Arctic Wings, Ltd., Churchill, Manitoba, Canada. Routes: Regular services in Hudson Bay area and occasional mail services as far north as Arctic Bay. Fleet: 2 Noorduyn Norseman, 1 Avro Anson and 1 Aeronca Champion.

Arkia-Airlines in Israel, Ltd., Tel Aviv, Israel (Israel's domestic airline). Routes: Domestic. Fleet: Curtiss Commandos.

Associated Air Taxi, Vancouver, B.C., Canada. Routes: Local services. Fleet: Not known.

ATSA (Aero Transportes, S.A.), Caracas, Venezuela. Routes: Mexico City to Monterrey. Fleet: Douglas DC-3s.

Australian National Airways, Pty., Ltd.† See page 585.

Avensa (Aerovias Venezolanas, S.A.), Caracas, Venezuela (an associate of P.A.W.A.). Routes: Domestic; mileage 1,500. Fleet: 2 Douglas DC-4s and 16 DC-3s.

Aviaca (Aerovias Nacionales de Colombia, S.A.).* Bogota, Colombia (a subsidiary of P.A.W.A.). Routes: In South America and to Europe and the United States; mileage 8,000. Fleet: Lockheed Constellations, 8 Douglas DC-4s and 24 DC-3s.

Aviateca (Empresa Gustemalteca de Aviacion), Guatemala City, Guatemala. Routes: Domestic; mileage 2,000. Fleet: 6 Douglas DC-3s.

Aviacion y Comercio, S.A.,* Madrid, Spain. Routes: Domestic and to France, Canary Islands and West Africa. Fleet: 6 Bristol 170s; 3 more on order.

Bahamas Airways, Ltd., Nassau, Bahamas, B.W.I. Routes: Interisland and to U.S.A., Cuba and Jamaica. Fleet: Douglas DC-3s, Convair Catalinas and Grumman Gray Geese.

Barrier Reef Airways, Pty., Ltd., Brisbane, Queensland, Australia. Routes: Brisbane to islands off the Queensland coast; mileage 2,000. Fleet: 2 Short Sandringhams and 2 Convair Catalinas.

Bharat Airways, Ltd., Calcutta, India. Routes: Domestic and to Burma, Singapore and Thailand; mileage 4,500. Fleet: 4 Douglas DC-4s and 11 DC-3s.

Bonanza Air Lines, Inc., Las Vegas, Nevada, U.S.A. Feederline routes in Nevada and Arizona. Fleet: 4 Douglas DC-3s.

Braathens South-American and Far East Airtransport A/S. (S.A.F.E.), Oslo, Norway (Norwegian independent operator). Routes: Norway to India, Thailand and Hongkong; mileage 12,000. Fleet: 3 Douglas DC-4s and 1 DC-3; 2 D.H. Herons on order for domestic routes.

Branniff International Airways,* Dallas, Texas, U.S.A. Routes: To Chicago, Denver, Memphis, Brownsville, other U.S. cities and through South America to Buenos Aires and Rio de Janeiro; mileage 10,000. Fleet: 6 Douglas DC-6s, 9 DC-4s and 16 DC-3s.

Bristol Bay Airlines, Bristol Bay, Alaska. Routes: Local. Fleet: Bellanca Skyrocket, Stinson Station-wagon and Reliant.

British Guiana Airways, Ltd., Georgetown, British Guiana. Routes: Domestic; mileage 2,500. Fleet: 2 Douglas DC-3s and 3 Grumman Gray Geese.

British Commonwealth Pacific Airlines, Ltd.* (Associate of B.O.A.C.).—See page 587.

British European Airways Corporation.*—See page 585.

British Overseas Airways Corporation.*—See page 585.

British West Indian Airways, Ltd., Port of Spain, Trinidad, B.W.I. (owned by B.O.A.C.). Routes: In the West Indies and to Florida; mileage 5,000. Fleet: Vickers-Armstrongs Vikings and Lockheed Lodestars.

Butler Air Transport, Pty., Ltd., Sydney, N.S.W., Australia. Routes: Sydney to country districts; mileage 3,000. Fleet: 5 Douglas DC-3s and 5 Avro Ansons.

Byers Air Service, Manley Hot Springs, Alaska. Routes: Local. Fleet: Stinsons and Cunningham-Halls.

California Central Airlines, Burbank, Cal., U.S.A. Feederline routes in California. Fleet: 5 Martin 2-0-2s.

Canadian Pacific Airlines, Ltd.*—See page 587.

Capital Airlines, Inc., Washington, D.C., U.S.A. Routes: Extensive network in Eastern States and to New Orleans, Memphis and Minneapolis; mileage 4,000. Fleet: Lockheed Constellations, Douglas DC-4s, DC-3s and Super-DC-3s.

Caribair (Caribbean Atlantic Airlines, Inc.), San Juan, Puerto Rico. Routes: Domestic and to Dominican Republic and Virgin Islands; mileage 500. Fleet: 3 Douglas DC-3s.

Caribbean International Airways, Ltd., Nassau, Bahamas, B.W.I. Routes: Jamaica to Cayman Islands and Florida. Fleet: Convair Catalinas.

Caspar Air Charters and Agencies, Ltd., Entebbe, Uganda (in association with E.A.A.C.). Routes: Local. Fleet: D.H. Rapides.

CAT (Civil Air Transport), Taipeh, Taiwan (Formosa). Routes: Formosan domestic routes and to Japan, Hongkong, French Indo-China and Thailand. Fleet: Skylarks (Curtiss Commandos) and Douglas DC-3s.

Cathay Pacific Airways, Ltd., Hongkong. Routes: Hongkong to Manila, French Indo-China, Labuan and Singapore; mileage 5,000. Fleet: Douglas DC-4s and DC-3s.

CAUSA (Compania Aeronautica Uruguaya, S.A.), Montevideo, Uruguay. Route: Montevideo-Buenos Aires; mileage 219. Fleet: 2 Short Sandringhams and 3 Short Hythes.

Central Aerea, Ltda., Rio de Janeiro, Brazil.—See Consórcio Nacional de Transportes Aéreos.

Central African Airways Corporation,* Salisbury, Southern Rhodesia. Routes: In Central Africa and to South Africa; mileage 7,000. Fleet: 9 Vickers-Armstrongs Vikings and 5 D.H. C. Beavers.

Central Air Transport Corporation (CATC), China. No information available.

Central Airlines, Inc., Fort Worth, Texas, U.S.A. Feederline routes in the Central Southern States. Fleet: Douglas DC-3s.

Central Northern Airways, Ltd., Winnipeg, Manitoba, Canada. Routes: Local. Fleet: Lockheed, Fairchild, Waco, Cessna, Avro Anson, Noorduyn Norseman and other types.

Chicago and Southern Air Lines,* Memphis, Tennessee, U.S.A. Routes: Memphis to Chicago, Detroit, Houston, Kansas City, New Orleans and other U.S. cities, Cuba, Jamaica and Venezuela; mileage 5,000. Fleet: 3 Lockheed Constellations, 5 Douglas DC-4s and 12 DC-3s.

China National Aviation Corporation (CNAC), China. No information available.

Christensen Air Service, Anchorage, Alaska. Routes: Local; mileage 75. Fleet: Noorduyn Norseman, Grumman Widgeon and Waco.

CMA (Compañia Mexicana de Aviacion, S.A.), Mexico City, Mexico (subsidiary of P.A.W.A.). Routes: Domestic and to California and Cuba; mileage 5,000. Fleet: 3 Douglas DC-6s, 5 DC-4s and 10 DC-3s.

Colonial Airlines, Inc., New York City, N.Y., U.S.A. Routes: In the Eastern States and to Bermuda and Canada; mileage 2,000. Fleet: 4 Douglas DC-4s and 8 DC-3s.

Commercial Air Services (Pty.), Ltd., Johannesburg, Transvaal, Union of South Africa. Routes: Local. Fleet: 1 D.H. Dove, and Cessna 120, 140, 170 and 195.

Compania Cubana de Aviacion, S.A.,* Havana, Cuba (subsidiary of P.A.W.A.). Routes: Domestic, and to Miami, Bermuda, Portugal and Spain; mileage 6,500. Fleet: 2 Douglas DC-4s and 6 DC-3s.

Compania de Aviacion Faucett, S.A., Lima, Peru. Routes: Domestic services; mileage 3,000. Fleet: Douglas DC-4s and DC-3s.

Compania Dominicana de Aviacion, S.A., Ciudad Trujillo, Dominican Republic. (Associate of P.A.W.A.) Routes: Domestic and to Puerto Rico and Florida; mileage 350. Fleet: 5 Curtiss Commandos and 2 Douglas DC-3s.

Connellan Airways, Ltd., Alice Springs, Northern Territory, Australia. Routes: Local services; mileage 5,500. Fleet: D.H. Rapides.

Consorcio Nacional de Transportes Aereos, Rio de Janeiro, Brazil. Consists of Central Aérea, Ltda.; Organisação Mineira de Transportes Aéreos (OMTA), Transportes Aéreos Nacional, Ltda., and Viação Aérea Brasil, S.A. Routes: Domestic. Fleet: Douglas DC-3s.

Continental Air Lines, Inc., Denver, Colorado, U.S.A. Routes: In Denver, New Mexico, Texas, Oklahoma and Kansas; mileage 2,500. Fleet: 5 Convair-Liners and 10 Douglas DC-3s.

COPA (Compania Panamena de Aviacion, S.A.), Panama City, Panama (Associate of P.A.W.A.). Routes: Local. Fleet: 2 Douglas DC-3s.

Cordova Air Service, Inc., Cordova, Alaska. Routes: Local. Fleet: Noorduyn Norseman, Cessna T-50 and other small aircraft.

Corps d'Aviation de l'Armee Haiti, Port au Prince, Haiti. Routes: Local; mileage 500. Fleet: Douglas DC-3s and Beech 18s.

Cosara (Société des Transports Aériens de l'Extrême Orient), Saigon, French Indo-China. Routes: Local; mileage 2,000. Fleet: Douglas DC-6s.

ČSA (Československé Aerolinie, n.p.)* Prague, Czechoslovakia (the Czech national airline). Routes: Domestic and to Austria, Bulgaria, Denmark, Finland, Germany, Hungary, Poland, Roumania and Sweden; mileage 6,000. Fleet: IL 12s and Douglas DC-3s.

Cyprus Airways, Ltd.,* Nicosia, Cyprus. (An associate of B.E.A. and B.O.A.C.) Routes: To Egypt, Greece, Israel, Italy, the Lebanon, Persian Gulf, Sudan and Turkey; mileage 2,500. Fleet: 6 Douglas DC-3s.

Deccan Airways, Ltd.,† Hyderabad, India. Routes: Domestic; mileage 2,000. Fleet: 6 Douglas DC-3s.

Delta Air Lines, Inc., Atlanta, Georgia, U.S.A. Routes: To Chicago, Miami, New Orleans and Fort Worth; mileage 3,000. Fleet: 6 Douglas DC-6s, 7 DC-4s and 19 DC-3s.

DETA (Divisão de Exploração das Transportes Aéreos),* Lourenco Marques, Mozambique. Routes: Domestic and to Durban, Johannesburg and Salisbury; mileage 2,000. Fleet: 3 Douglas DC-3s, 6 D.H. Doves, 5 D.H. Rapides, 2 Lockheed Lodestars, 1 Lockheed 14 and 1 Junkers Ju 52/3ms.

DHY (Devlet Hava Yollari), Ankara, Turkey (Turkish State Air Lines). Routes: Domestic and to Cyprus, Egypt and the Lebanon; mileage 2,500. Fleet: 32 Douglas DC-3s.

DTA (Divisão des Transportes Aéreos),* Luanda, Angola. Routes: Local and to Leopoldville; mileage 2,500. Fleet: Douglas DC-3s, D.H. Rapides and Stinson Reliants.

East African Airways Corporation,* Nairobi, Kenya. (An associate of B.O.A.C.) Routes: In East Africa and to South Africa; mileage 3,000. Fleet: Douglas DC-3s, Lockheed Lodestars and D.H. Rapides.

Eastern Air Lines, Inc.,† New York City, N.Y., U.S.A. Routes: Extensive network in the Eastern and Southern States and to Puerto Rico and Mexico; mileage 7,000. Fleet: 14 Lockheed L-1049 Super-Constellations, 20 L-649 and L-749 Constellations, 25 Douglas DC-4s, 29 DC-3s; Martin 4-0-4s coming into service and L-1049C Super-Constellations on order.

East-West Airlines, Ltd., Tamworth, N.S.W., Australia. Routes: Inland route, Brisbane-Sydney; mileage 500. Fleet: 3 Lockheed Hudsons and 2 Avro Ansons.

El Al (Israel Airlines, Ltd.),* Tel Aviv, Israel. Routes: Israel to London and other European centres, U.S.A., East and South Africa. Fleet: 3 Lockheed Constellations, 2 Douglas DC-4s and Curtiss Commandos.

Ellis Air Lines, Ketchikan, Alaska. Routes: Domestic; mileage 288. Fleet: 6 Grumman Gray Geese.

Empire Air Lines, Inc., Boise, Idaho, U.S.A. Feederline routes in Idaho, Oregon and Washington. Fleet: 5 Douglas DC-3s.

Ethiopian Air Lines, Inc., Addis Ababa, Ethiopia (the Ethiopian national airline). Routes: Domestic and to Aden, Egypt, Kenya, Saudi Arabia and Pakistan; mileage 7,000. Fleet: 2 Convair-Liners and 9 Douglas DC-3s.

Federation Air Service, Singapore, Malaya (operating in association with Malayan Airways, Ltd.). Routes: Kuala Lumpur to Singapore and local services. Fleet: D.H.C. Beavers.

Fiji Airways, Nandi, Fiji. Routes: Local. Fleet: 2 D.H. Rapides.

Flugfelag Islands, H.F. (Iceland Airways),* Reykjavik, Iceland. Routes: Domestic and to the United Kingdom and Denmark. Fleet: 1 Douglas DC-4, 3 DC-3s, 1 Convair Catalina, 2 Cansos, 1 Grumman Gray Goose, 1 D.H. Dragon Rapide and 1 Noorduyn Norseman.

Frontier Airlines, Inc., Denver, Colorado, U.S.A. Feederline routes in Colorado, Montana, Arizona, New Mexico, Utah and Wyoming. Fleet: 12 Douglas DC-3s.

Garuda Indonesian Airways N.V., Djakarta, United States of Indonesia (the Indonesian national airline). Routes: In Indonesia and to Manila and Singapore. Fleet: 8 Convair-Liners, 22 Douglas DC-3s and 8 Convair Cansos; 14 D.H. Herons on order.

Gibbs-Sepik Airways, Port Moresby, New Guinea. Routes: Services in New Guinea. Fleet: D.H. Dragons and Noorduyn Norseman.

Gibraltar Airways, Ltd., Gibraltar (subsidiary of B.E.A.). Route: Gibraltar to Tangier. Fleet: 3 D.H. Rapides.

Gulf Aviation Co., Ltd., Bahrein Island, Persian Gulf. Routes: Local. Fleet: Douglas DC-3s, Avro Ansons and D.H. Dove.

Guinea Airways, Ltd., Adelaide, South Australia. Routes: Within South Australia and to N.S.W. and Victoria; mileage 1,000. Fleet: 3 Douglas DC-3s.

Hamlats (Sino-Soviet Aviation Corporation), Alma Ata, U.S.S.R. Routes: Alma Ata to Hami; mileage 500. Fleet: Li 2s.

Hawaiian Airlines, Ltd., Honolulu, Hawaii. Routes: Inter-island. Fleet: 13 Douglas DC-3s.

Helicopter Air Service, Inc., Chicago, Illinois, U.S.A. Short-haul mail operator. Routes: Helicopter mail services in Chicago area. Fleet: 6 Bell 47s.

Himalayan Aviation, Ltd., Calcutta, India. Routes: Domestic and to Afghanistan and Iran; mileage 2,000. Fleet: 3 Douglas DC-3s.

Hong Kong Airways, Ltd., Hong Kong. Route: Hong Kong to Formosa. Fleet: 4 Douglas DC-3s.

Iberia (Lineas Aereas Españolas),* Madrid, Spain (Spanish national airline). Routes: Domestic and to France, United Kingdom, Italy, Switzerland, West Africa, South America and Cuba; mileage 20,000. Fleet: Douglas DC-4s, DC-3s, Junkers Ju 52/3ms, Airspeed Consuls and D.H. Rapides; 4 Bristol 170s on order.

Indian National Airways, Ltd., New Delhi, India. Routes: Domestic and to Burma, Nepal and Pakistan; mileage 3,000. Fleet: 6 Vickers-Armstrongs Vikings and 7 Douglas DC-3s.

Iranian Airways Co., Teheran, Iran. Routes: Domestic and to Persian Gulf, Pakistan and India. Fleet: 6 Douglas DC-3s, 3 D.H. Doves, 2 Fairchild Argus, and Curtiss Commandos.

Iraqi Airways,* Baghdad, Iraq. (An associate of B.O.A.C.) Routes: To Persian Gulf, Egypt, the Lebanon and Syria. Fleet: 3 Vickers-Armstrongs Vikings and 3 D.H. Doves.

Japan Air Lines Co., Ltd. (Nihon Koku Kabushiki Kaisha), Tokyo, Japan. Routes: Domestic. Fleet: Martin 2-0-2 and Douglas DC-4.

Jugoslovenski Aero Transport (JAT),* Belgrade, Yugoslavia (the Yugoslav national airline). Routes: Domestic and to Austria, France, Germany, Greece and Switzerland. Fleet: 8 Douglas DC-3s and 2 Short Sealands.

Kalinga Air Lines, Calcutta, India. Routes: Domestic; mileage 197. Fleet: 3 Douglas DC-3s.

Karhumaki Airways (Veljekset Karhumäki), Kuorevesi, Finland. Routes: Domestic and to Sweden. Fleet: Lockheed Lodestars.

K.L.M. (Koninklijke Luchtvaart Maatschappij).*—See page 587.

Korean National Airlines, Pusan, Korea. Routes: Domestic. Fleet: Not known.

LAB (Lloyd Aero Boliviano), Cochabamba, Bolivia. Routes: Domestic. Fleet: Douglas DC-3s.

LACSA (Lineas Aereas Costarricenses, S.A.), San Jose, Costa Rica (subsidiary of P.A.W.A.). Routes: Domestic and to Panama, Nicaragua, Cuba and the U.S.A. Fleet: Douglas DC-3s and Curtiss Commandos.

LADE (Lineas Aereas del Estado), Buenos Aires, Argentina. Routes: Domestic. Fleet: Vickers-Armstrongs Vikings and Douglas DC-3s.

LAI (Linee Aeree Italiane, S.p.A.), Rome, Italy. Routes: Domestic and to France, Trieste, Spain, Greece, Turkey, Israel, Egypt, Tunis and New York. Fleet: 2 Douglas DC-6s and DC-3s.

Lake Central Airlines, Indianapolis, Indiana, U.S.A. Routes: Local. Fleet: Douglas DC-3s and Beech Bonanzas.

LAMSA (Lineas Aereas Mexicanas, S.A.), Mexico City, Mexico (in association with United Air Lines). Routes: Domestic; mileage 1,500. Fleet: 5 Douglas DC-3s.

LAN (Lineas Aereo Nacional, Chile),* Santiago, Chile. Routes: Domestic and to the Argentine and Uruguay. Fleet: Martin 2-0-2s, Douglas DC-3s, Lockheed Lodestars, Electras and D.H. Dragon Rapides.

La Nica (Lineas Aereas de Nicaragua, S.A.), Managua, Nicaragua (an associate of Pan American World Airways). Routes: Local; mileage 1,000. Fleet: Douglas DC-3s.

LANSA (Lineas Aereas Nacionales, S.A.), Barranquilla, Colombia (in association with Avianca). Routes: Domestic and to Cuba and U.S.A. Fleet: 2 Douglas DC-4s and 13 DC-3s.

LAV (Linea Aeropostal Venezolana),* Caracas, Venezuela. Routes: Domestic and to Cuba, Peru and U.S.A.; mileage 7,000. Fleet: 4 Lockheed Constellations, 2 Martin 2-0-2s and 20 Douglas DC-3s.

Leavens Brothers Air Services, Ltd., Toronto, Canada. Route: Leamington to Pelee Island. Fleet: Cessna Crane and Aeronca Sedan.

Lineas Aereas del Pacifico, Ensenada, Mexico. Routes: Domestic services; mileage 1,500. Fleet: Douglas DC-3s.

Linea Aerea del Pacifico Sur, Ltda. (Lipa-Sur), Santiago, Chile. Routes: Local. Fleet: D.H. Dragon Rapides.

Linea Aerea Taca de Venezuela, Caracas, Venezuela. Routes: Domestic and to Colombia. Fleet: Douglas DC-3s.

Loftleidir, H.F. (Icelandic Airlines), Reykjavik, Iceland. Routes: Domestic. Fleet: Douglas DC-3s and Convair Catalinas.

Loide Aereo Nacional S/A, Rio de Janeiro, Brazil. Routes: Domestic. Fleet: Curtiss Commandos.

Los Angeles Airways, Inc., Los Angeles, California, U.S.A. Short-haul mail operator. Routes: Helicopter mail services in Los Angeles area. Fleet: Sikorsky S-51s; S-55s on order.

LOT (Polskie Linie Lotnicze),* Warsaw, Poland (the Polish national airline). Routes: Domestic and to Belgium, Czechoslovakia, Denmark, France, Germany, Hungary, Roumania, and Sweden; mileage 4,500. Fleet: About 30 Douglas DC-3s and 4 IL 12s.

MacRobertson - Miller Aviation Co., Pty., Ltd., Perth, Western Australia. Routes: In Western Australia and to Northern Territory; mileage 5,000. Fleet: 3 Douglas DC-3s, 1 Lockheed Electra and 5 Avro Ansons.

Malayan Airways, Ltd., Singapore, Malaya (an associate company of B.O.A.C.). Routes: Domestic and to Sumatra, Thailand, French Indo-China, Burma, and other services. Fleet: 7 Douglas DC-3s and 2 Airspeed Consuls.

Malta Airlines, The, Valetta, Malta. Routes: To Benghazi, Cairo, Catania, Rome and Tripoli. Fleet: Vickers-Armstrongs Vikings owned and operated by B.E.A.

Maritime Central Airways, Charlottetown, Prince Edward Island, Canada. Routes: Services in the Maritimes. Fleet: 4 Douglas DC-3s, 1 Curtiss Commando and 1 Convair Canso.

Masovlet (Magyar-Szoviet Polgari Legiforgalmi), Budapest, Hungary (the Hungarian-Soviet airline). Routes: Domestic and to Czechoslovakia and Roumania; mileage 1,500. Fleet: 10 LI 2s (Soviet DC-3s).

Mid-Continent Airlines, Inc., Kansas City, Missouri, U.S.A. Routes: In the Central States; mileage 3,500. Fleet: 3 Convair-Liners and 19 Douglas DC-3s.

Middle East Airlines Co., Beirut, Lebanon. Routes: To Syria, Egypt, Iraq, Arabia, Jordan, Kuwait and Cyprus. Fleet: 6 Douglas DC-3s.

Midway Airlines, Inc., Chicago, Illinois, U.S.A. Feederline routes: Chicago Airport's shuttle service. Fleet: 3 Cessna 195As.

Mid-West Airlines, Inc., Omaha, Nebraska, U.S.A. Feederline routes in Nebraska, Iowa, Minnesota and South Dakota. Fleet: Cessna 190s.

Misrair, S.A.E.,* Cairo, Egypt (the principal Egyptian airline). Routes: Domestic and to Aden, Cyprus, Greece, Iran, Iraq, Italy, Jerusalem, Kuwait, Lebanon, Saudi Arabia, Sudan, Switzerland, Syria and Turkey; mileage 8,500. Fleet: S.N.C.A.S.O. Languedocs and Vickers-Armstrongs Vikings.

THE WORLD'S AIRLINES . . .

Mont-Laurier Aviation Co., Ltd., Roberval, Quebec, Canada. Route: Roberval to Dore Lake. Fleet: Convair Cansos, Noorduyn Norseman and D.H. Fox Moth.

National Airlines, Inc.,* Miami, Florida, U.S.A. Routes: New York and Washington to Jacksonville, Tampa, Miami and Havana, and New Orleans to Jacksonville, Tampa and Miami; mileage 3,000. Fleet: 7 Douglas DC-6s, 6 DC-4s and Lockheed Lodestars.

Navegacao Aerea Brasileira (N.A.B.), Rio de Janeiro, Brazil. Routes: Domestic. Fleet: Not known.

New Zealand National Airways Corporation,* Wellington, New Zealand. Routes: Domestic and to Norfolk Is., Fiji, Samoa and other points. Fleet: Douglas DC-3s, Lockheed Lodestars, Electras, D.H. Dragon Rapides, Fox Moths and Short Sunderlands.

Northeast Airlines, Inc., Boston, Mass., U.S.A. Routes: Serve New York, Montreal and New England. Fleet: 4 Convair-Liners, 8 Douglas DC-3s and DC-4s.

Northern Consolidated Airlines, Anchorage, Alaska. Routes: Local. Fleet: Not known.

Northern Wings, Ltd., Seven Islands, Quebec, Canada. Routes: Local. Fleet: Noorduyn Norseman, Beech, Avro Ansons, and Convair Cansos.

Northwest Airlines, Inc.*—See page 588.

Organisaçao Mineira de Transportes Aereos (OMTA), Belo Horizonte, Brazil.—See Consórcio Nacional de Transportes Aéreos.

Orient Airways, Ltd., Karachi, Pakistan. Routes: Services in Pakistan and to India and Burma; mileage 4,500. Fleet: Convair-Liners and Douglas DC-3s.

Overland Air Services (Pty.), Ltd., Sydney, N.S.W., Australia. Routes: Local. Fleet: Lockheed Lodestars.

Ozark Air Lines, Inc., East St. Louis, Ill., U.S.A. Feederline routes in Arkansas, Indiana, Iowa, Oklahoma, Kentucky, Kansas, Missouri, Illinois and Tennessee. Fleet: 5 Douglas DC-3s.

P.A.W.A.—See Pan American World Airways, Inc., page 588.

Pacific Northern Airlines, Seattle, Washington, U.S.A. Routes: In Alaska and between U.S.A. and Alaska. Fleet: Douglas DC-4s, DC-3s, Lockheed 12s, Cessna Cranes and other small aircraft.

Pan American World Airways, Inc.*—See page 588.

Panagra (Pan American-Grace Airways, Inc.),* New York City, N.Y., U.S.A. (Associate of P.A.W.A.). Routes: In and through South America from Buenos Aires to Panama and Miami; mileage 6,000. Fleet: 6 Douglas DC-6s, 4 DC-4s and 10 DC-3s.

Panair do Brasil, S.A.,* Rio de Janeiro, Brazil. (Subsidiary of P.A.W.A., principal Brazilian international airline.) Routes: Domestic and to Argentina, Chile, Europe, the Near East, Paraguay, Uruguay and West Africa; mileage 20,500. Fleet: 6 Lockheed Constellations, 19 Douglas DC-3s and 4 Convair Cansos.

Philippine Air Lines, Inc.,* Manila, Philippines (the Philippines national airline). Routes: Inter-island services and trunk routes to Europe, U.S.A., and Japan; mileage 24,500. Fleet: Douglas DC-6s and DC-3s; 2 DC-4Bs and 4 Convair-Liner 3400 on order.

Piedmont Airlines, Winston-Salem, North Carolina, U.S.A. Feederline routes in North and South Carolina, Kentucky, Ohio, Tennessee, Virginia and West Virginia. Fleet: 8 DC-3s.

Pioneer Air Lines, Inc., Houston, Texas, U.S.A. Feederline routes in Texas and New Mexico. Fleet: 12 Douglas DC-3s; 19 Martin 2-0-2s entering service.

Pluna (Primeras Lineas Uruguayas de Navigacion Aerea), Montevideo, Uruguay. Routes: Domestic services and to Brazil and the Argentine; mileage 1,500. Fleet: Douglas DC-3s.

Provincetown - Boston Airline, Provincetown, Mass., U.S.A. Routes: Local services in summer. Fleet: Not known.

Qantas Empire Airways, Ltd.*—See page 588.

Queen Charlotte Airlines, Ltd., Vancouver, British Columbia, Canada (Canada's third largest airline). Routes: Services in British Columbia. Fleet: Avro Ansons, Noorduyn Norseman, Supermarine Stranraer, Beech 18s and Fairchild Husky.

Queensland Airlines (Pty.), Ltd., Brisbane, Queensland, Australia. Routes: In Queensland. Fleet: Douglas DC-3s, Lockheed Lodestars and D.H. Rapides.

REAL (Redes Estaduais Aereas, Ltda.), São Paulo, Brazil. Routes: Domestic. Fleet: 24 Douglas DC-3s.

Reeve Aleutian Airways, Inc., Anchorage, Alaska. Routes: To the Aleutians. Fleet: Douglas DC-3s.

Rimouski Airlines, Ltd., Rimouski, Quebec, Canada. Routes: Local. Fleet: Not known.

Robinson Airlines Corporation, Ithaca, New York, U.S.A. Feederline routes in New York State. Fleet: 5 Douglas DC-3s.

S.A. Viaçao Aerea Gaucha (Savag), Rio Grande do Sul, Brazil. Routes: Domestic. Fleet: Douglas DC-3s.

Sabena (Société Anonyme Belge d'Exploitation de la Navigation Aérienne).*—See page 589.

SAIDE (Services Aériens Internationaux d'Egypte), Cairo, Egypt. Routes: To Germany, Greece, Italy, Libya, Malta and Tunis. Fleet: 3 SIAI-Marchetti S.M.95s and 3 Fiat G.212s.

SATA (Sociedade Açoriana de Transportes Aéreos, Ltda.), Ponta Delgada, Azores. Routes: Local; mileage 380. Fleet: 2 D.H. Doves.

Saudi Arabian Airlines, Jeddah, Saudi Arabia. Routes: Domestic and to Egypt, the Lebanon, Syria and Persian Gulf. Fleet: 12 Douglas DC-3s and 5 Bristol 170s.

Scandinavian Airlines System.*—See page 589.

Servicio Aereo de Honduras, S.A. (SAHSA), Tegucigalpa, Honduras (Associate of P.A.W.A.). Routes: Domestic services and to British Honduras and San Salvador; mileage 1,500. Fleet: 6 Douglas DC-3s.

Servicos Aereos Cruzeiro do Sul, Ltda., Rio de Janeiro, Brazil. Routes: Domestic and to Buenos Aires; mileage 10,500. Fleet: 2 Douglas DC-4s and 23 DC-3s.

SOBELAIR, Brussels, Belgium. Routes: To the Belgian Congo. Fleet: Douglas DC-3s.

Sociedad Aerea del Tolima, S.A. (Saeta), Bogota, Colombia. Routes: Local; mileage 500. Fleet: 5 Douglas DC-3s.

South African Airways,* Johannesburg, Transvaal, Union of South Africa. Routes: Domestic and to Southern Rhodesia, Mozambique and United Kingdom; mileage 13,500. Fleet: 4 Lockheed Constellations, Lodestars, Douglas DC-4s and DC-3s.

South Coast Airways (Pty.), Ltd., Wollongong, N.S.W., Australia. Routes: Local; mileage 272. Fleet: Douglas DC-3s and Lockheed Electras.

Southern Airways, Inc., Atlanta, Georgia, U.S.A. Routes: Services in the Southern States. Fleet: Douglas DC-3s.

South-West Air Transport (Pty.), Ltd., Windhoek, South-West Africa. Routes: Local. Fleet: Ryan Navions.

Southwest Airways Company, South San Francisco, California, U.S.A. Feederline routes in California and to Medford, Oregon. Fleet: 10 Douglas DC-3s.

Sudan Airways, Khartoum, Anglo-Egyptian Sudan. Routes: Domestic; mileage 3,000. Fleet: D.H. Doves.

Swissair (Swiss Air Transport Company).*—See page 590.

Syrian Airways Company, Damascus, Syria. Routes: Domestic. Fleet: Douglas DC-3s.

TABSO (Bulgarski Vadouzni Linii), Sofia, Bulgaria (the Bulgarian-Soviet airline). Routes: Domestic. Fleet: LI 2s (Soviet DC-3s); reported to have IL 12s.

T.A.C. (Empresa de Transportes Aéreos Catarinense, S.A.), Florianopolis, Brazil. Routes: Domestic. Fleet: Douglas DC-3s.

Taca de Costa Rica, S.A., San Jose, Costa Rica. Routes: Domestic. Fleet: Douglas DC-3s.

Taca de Honduras, Tegucigalpa, Honduras. Routes: Domestic. Fleet: Douglas DC-3s.

Taca International Airlines, S.A., New Orleans, Louisiana, U.S.A. Routes: Serving Mexico, Costa Rica, Guatemala, Nicaragua, El Salvador, British Honduras and Honduras. Fleet: Douglas DC-4s and DC-3s.

TAE (National Greek Airlines),* Athens, Greece. Routes: Domestic and to Cyprus, Egypt, France, Israel, Italy, United Kingdom, Yugoslavia and Turkey. Fleet: 1 Douglas DC-4 and 18 Douglas DC-3s.

TAI (Compagnie de Transportes Aériens Intercontinentaux), Paris, France. Routes: From France to French West Africa, Madagascar and French Indo-China. Fleet: 6 Douglas DC-4s and one S.N.A.C.A.S.E. Armagnac.

TAP (Transportes Aéreos Portugueses),* Lisbon, Portugal (principal Portuguese airline). Routes: Domestic and to France, Spain, United Kingdom and Portuguese Africa; mileage 7,500. Fleet: 3 Douglas DC-4s and 6 DC-3s.

TARS (Societate Romîno-Sovietîcă de Transporturi Aeriene), Bucharest, Roumania (the Roumanian-Soviet airline). Routes: Domestic and to Czechoslovakia, Hungary and Poland; mileage 1,500. Fleet: 16 LI 2s. Reported to have 5 IL 12s.

Tasman Empire Airways, Ltd.* (Associate of B.O.A.C.).—See p. 590.

Thai Airways Company, Ltd. (TAC), Bangkok, Siam. Routes: Domestic and to Burma, French Indo-China, India and Singapore. Fleet: Douglas DC-4s, DC-3s, Boech Bonanzas and Noorduyn Norseman.

Townsville and Country Airways (Pty.), Ltd., Townsville, Queensland, Australia. Routes: Local; mileage 500. Fleet: Douglas DC-3s.

TPA (Aloha Airline), Honolulu, Hawaii. Routes: In the Hawaiian Islands. Fleet: Douglas DC-3s.

Trans-Australia Airlines† Melbourne, Victoria, Australia. Government-formed airline. Routes: Throughout Australia; mileage 21,500. Fleet: 5 Convair-Liners, 3 Douglas DC-4s, 22 DC-3s, 5 D.H. Dragons and 5 D.H. Devons; 5 Vickers-Armstrongs Viscounts on order.

Trans-Canada Air Lines.*—See page 590.

Trans Mar de Cortes, Guaymas, Mexico. Routes: Domestic services. Fleet: Not known.

Trans-Oceanic Airways (Pty.), Ltd., Sydney, N.S.W., Australia. Routes: In N.S.W. and to Lord Howe Island, New Guinea and Tasmania; mileage 3,000. Fleet: 2 Short Hythes and 2 Short Solents.

Trans-Texas Airways, Houston, Texas, U.S.A. Feederline routes in Texas. Fleet: 9 Douglas DC-3s.

Trans-World Airlines, Inc.*—See page 591.

Transportes Aereos de Jalisco, S.A., Guadalajara, Mexico. Routes: Domestic. Fleet: 2 Douglas DC-3s, Ford Trimotors and Cessna Cranes.

Transportes Aereos Militares (Peru), Lima, Peru. Routes: Domestic. Fleet: Douglas DC-3s, D.H. Rapides and Stinsons.

Transportes Aereos Nacional, Ltda., Rio de Janeiro, Brazil.—See Consórcio Nacional de Transportes Aéreos.

Transportes Aereos Nacionales S.A. (TAN Airlines), Miami, Florida, U.S.A. Routes: To Cuba, Honduras, Nicaragua and El Salvador. Fleet: Not known.

Trust Territory Operations, Guam, Marianas Islands (operated by Transocean Air Lines). Routes: To Caroline Is., Palau, and Marshall Islands. Fleet: Convair Catalina.

Tunis Air (Société Tunisienne de l'Air), Tunis, Tunisia. Routes to France, Algeria, Italy, Corsica and Tripoli. Fleet: 4 Douglas DC-3s.

UAT (Union Aéromaritime de Transport), Paris, France. Routes: To French Africa and French Indo-China. Fleet: 4 Douglas DC-4s, 3 D.H. Comets on order.

United Air Lines, Inc.,* Chicago, Ill., U.S.A. Routes: Transcontinental, West Coast and to Honolulu. Fleet: Boeing Stratocruisers, Douglas DC-6Bs, DC-6s, DC-4s, DC-3s and Convair-Liner 3400s.

Union of Burma Airways (UBA), Rangoon, Burma. Routes: Domestic and to Thailand. Fleet: 10 Douglas DC-3s and 3 D.H. Doves; 3 Handley Page Marathons on order.

Uraba, Medellin and Central Airways, Inc. (UMCA), Medellin, Colombia. Routes: Balboa to Medellin. Fleet: Douglas DC-3s.

VARIG (S.A. Empresa de Viação Aérea Rio Grandense),* Pôrto Alegre, Brazil (pioneer Brazilian airline). Routes: Domestic and to Argentina, and Uruguay. Fleet: 15 Douglas DC-3s, 6 Curtiss Commandos and 6 Lockheed Electras.

VASP (Viação Aérea São Paulo, S.A.), São Paulo, Brazil (important Brazilian airline). Routes: Domestic. Fleet: 13 Douglas DC-3s and 6 Saab-Scandias.

Viaçao Aerea Brasil, S.A., Rio de Janeiro, Brazil.—See Consórcio Nacional de Transportes Aéreos.

Vestlandske Luftfartselskap A/S (West Norway Airlines), Bergen, Norway. Route: Bergen to Trondheim (in summer). Fleet: Short Sealand.

West African Airways Corporation,* Lagos, Nigeria (an associate of B.O.A.C.). Routes: Domestic and to Gold Coast, Sierra Leone, Gambia, Dakar and Anglo-Egyptian Sudan; mileage 5,000. Fleet: D.H. Doves and Bristol 170s; 4 Handley Page Marathons on order.

West Coast Airlines, Seattle, Washington, U.S.A. Feederline routes in Washington and Oregon. Fleet: 6 Douglas DC-3s.

Western Air Lines, Inc., Los Angeles, California, U.S.A. Routes: In the Western States and Los Angeles to Edmonton and Denver to Edmonton and Minneapolis-St. Paul; mileage 3,000. Fleet: 10 Convair-Liners, 8 Douglas DC-4s and 10 DC-3s.

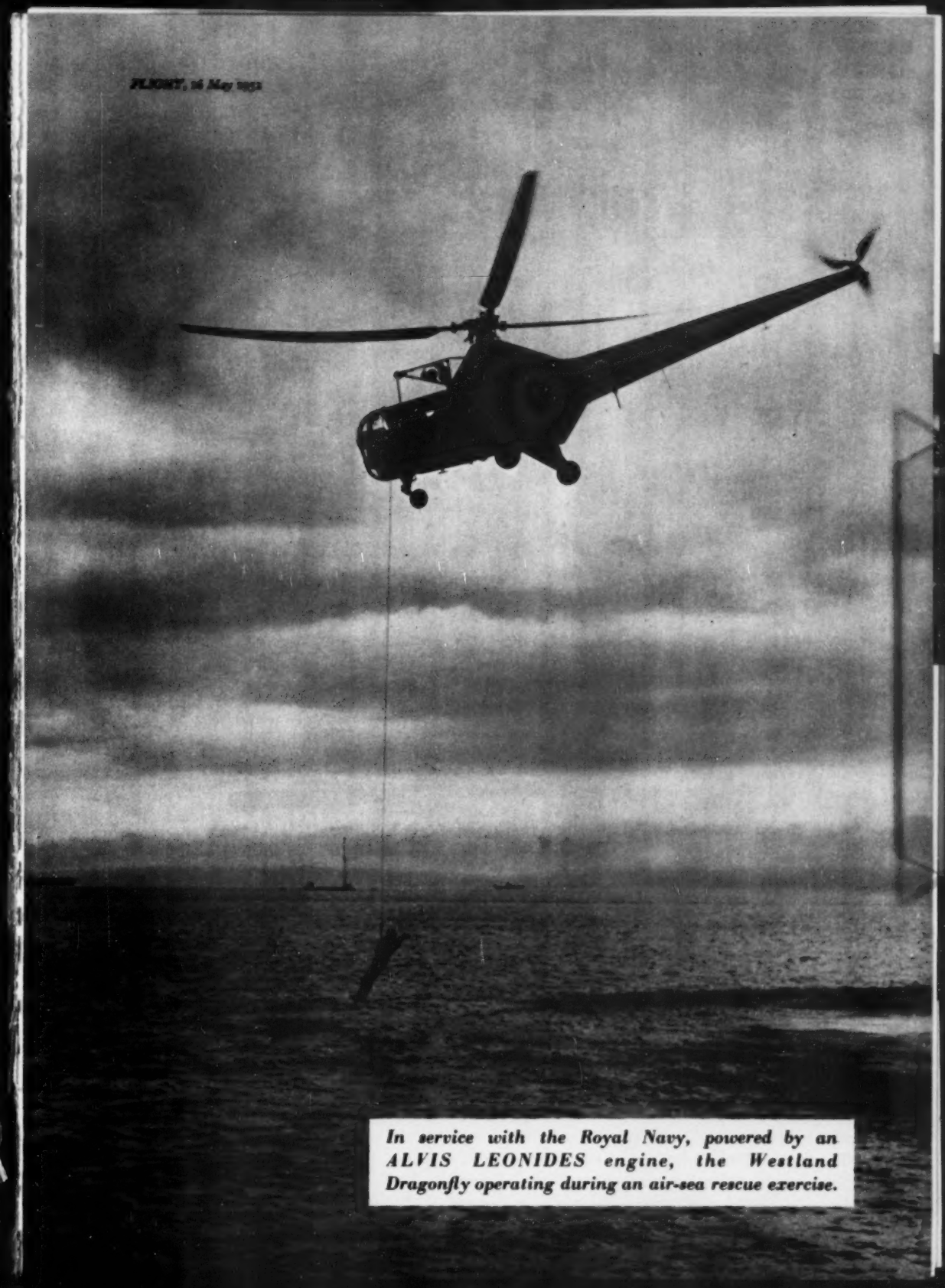
Wheeler Airlines, Ltd., St. Jovite, Quebec, Canada. Route: Montreal to St. Jovite. Fleet: Not known.

Wien Alaska Airlines, Inc., Fairbanks, Alaska. Routes: Domestic services. Fleet: Douglas DC-3s, Cessna 170 and 195 and Noorduyn Norseman.

Wiggins Airways, Norwood, Mass., U.S.A. Feederline routes in Massachusetts, Connecticut, New Hampshire, New York, and Rhode Island. Fleet: 6 Cessna T-50s.

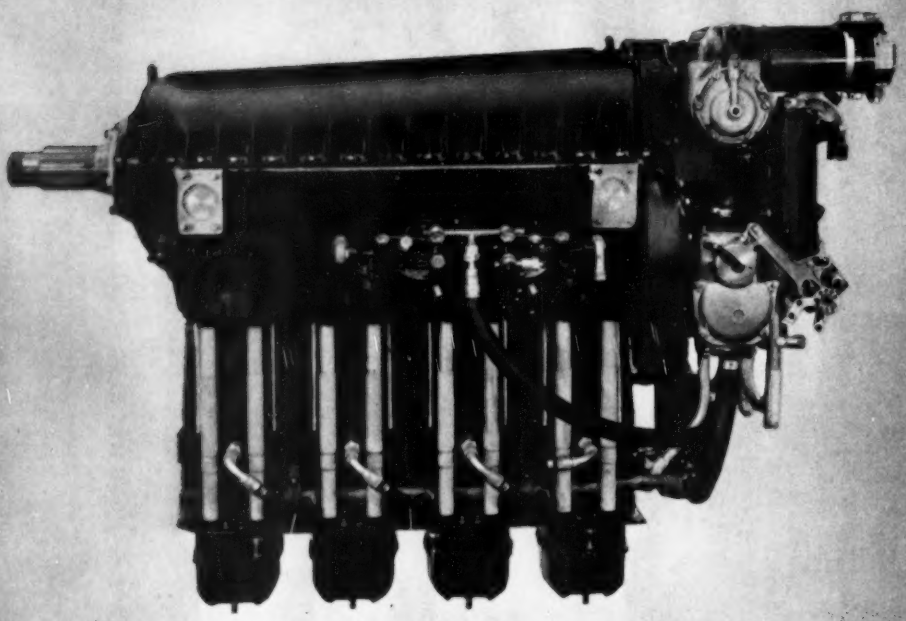
Wisconsin Central Airlines, Inc., Madison, Wisconsin, U.S.A. Feederline routes in Illinois, Michigan, Minnesota and Wisconsin. Fleet: Douglas DC-3s.

Woods Airways (Pty.), Ltd., Perth, Western Australia. Routes: Perth to Rottnest Island; mileage 25. Fleet: Avro Ansons.



In service with the Royal Navy, powered by an ALVIS LEONIDES engine, the Westland Dragonfly operating during an air-sea rescue exercise.

Eighteen speed records between Friday and Monday



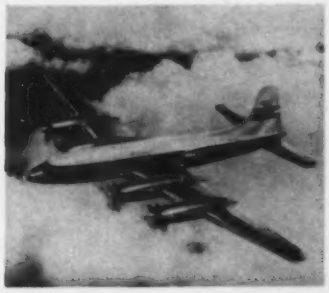
with the

GIPSY MAJOR IG

Mr. T. W. Hayhow, flying an Auster Aiglet with a de Havilland Gipsy Major IG engine of 130 b.h.p., set up (subject to official confirmation) 18 point-to-point light-aeroplane speed records over the Easter week-end.

DE HAVILLAND ENGINES

The de Havilland Engine Co. Ltd., Stonegrove, Edgware, Middlesex, England



COMMERCIAL AIRCRAFT TODAY

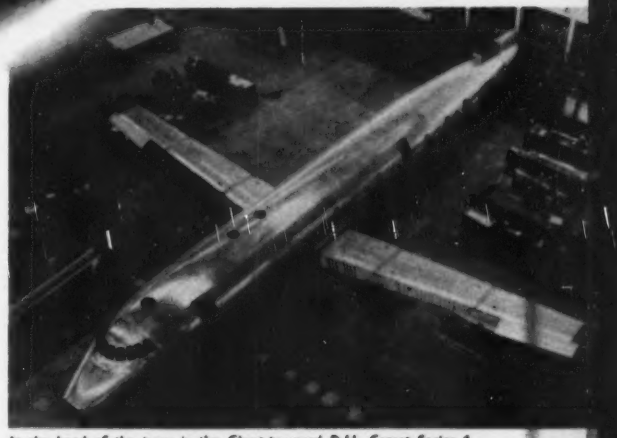
THOUGH for many years commercial aircraft—especially the larger among them—have tended to become stereotyped in layout, the following pages are proof of the variety in design and function which is characteristic of them today.

In the case of our own country this is attributable in some degree to the retention of a number of pre-war designs (even stick-and-string biplanes are to be found among them); but it is only necessary to name the Comet, Viscount, Apollo and Britannia as evidence that the breadth of our range extends to the future as well as to the past.

As for America, her indecision in the pressing matter of pure-jet airliners has occasioned widespread comment—not all of it complimentary—and as the Comet has passed into the ascendant, as it were, in B.O.A.C. service, so have America's stars inevitably waned. Reference to the American sections, however, will disclose that very strong competition will be forthcoming from the newest developments of established American types.

Among French designs the pervading mediocrity is relieved by one or two large freight-carriers, embodying some ingenious design features; but in the main the interest of the review centres on the British and American machines.

In the following summaries the types are segregated into three classes: large aircraft of 70,000 lb gross weight upwards; medium weight types, 12,500-70,000 lb; and lighter aircraft, below 12,500 lb.



At the head of the page is the Ghost-powered D.H. Comet Series 1. Two views above show the Bristol 175, Britannia as it will appear in B.O.A.C. service and in prototype form under construction.

70,000 lb AND ABOVE

Avro York. The York is a transport development of the war-time Lancaster bomber; 250 were built, of which the first was delivered to the R.A.F. in 1942. Although still used as a freight and passenger carrier by a decreasing number of independent companies it is no longer in scheduled service on any of the main airline routes. The York's fuselage can be adapted to carry up to 24 passengers, some 11,500 lb of freight, or combinations of both.

Span, 102ft; length, 78ft; wing area, 1,297 sq ft; weight empty, 39,458-43,438 lb; gross weight, 71,000 lb; cruising speed, 259 m.p.h. at 10,000ft; max range, 2,700 miles with 8,500 lb payload (heavy freighter version).

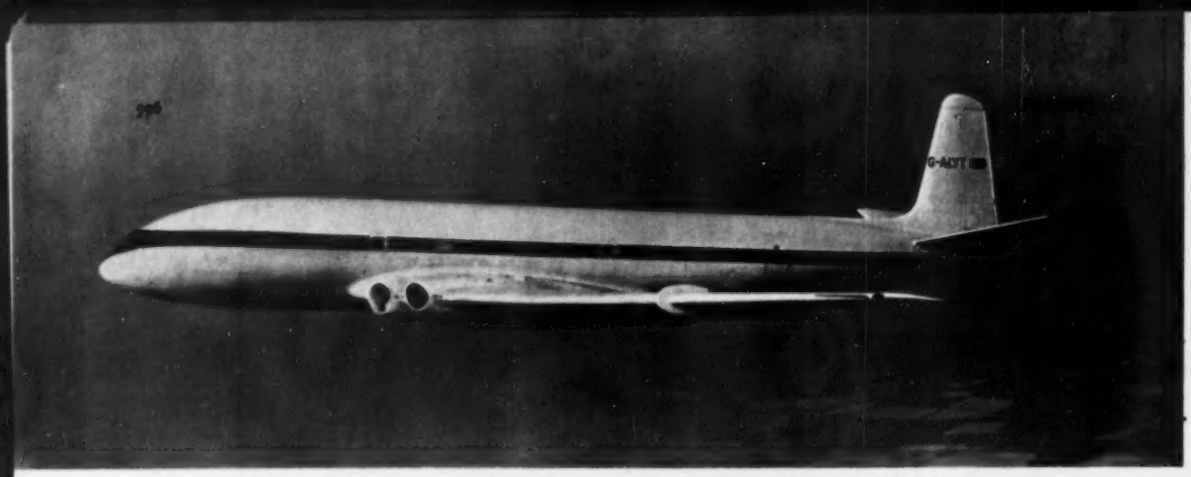
Blackburn and General Aircraft Universal Freighter. The Universal Freighter was designed as a general-purpose transport aircraft for military or civil use. The first prototype, which is powered by four Bristol Hercules 730s, each developing 2,020 h.p. for take-off, is now engaged on final phases of flight-testing prior to military trials. It is not yet known whether the manufacturers will receive the military contract on which commercial application of the design is thought to depend.

Now under construction is a second prototype, to be powered by Bristol Centaurus engines of some 2,950 h.p. The extra power will enable the Mk 2 to operate at an all-up weight of 127,000 lb, of which 40,000 will be payload. Maximum cruising speed will also be increased to 225 m.p.h. Operating costs of this machine should be low; the manufacturers claim that a figure of 10d per ton-mile will be possible for the 1,000-mile stage carrying 15½ short tons at a speed of 170 m.p.h. average. Excellent take-off and landing characteristics shown by the Mk 1 will not be impaired by the increased weight of the newer model, which, it is stated, will be the only aircraft capable of landing on a grass field 1,000ft long, loading 20 tons of freight and taking off again. The following figures apply to the Mk 2.

Span, 162ft; length, 99ft 2in; wing area, 2,916 sq ft; gross weight, 127,000 lb; typical performance: stage distance of 1,152 miles at 172 m.p.h. average speed on 53½ per cent power at 8,000ft with 29,400-lb payload.

Bristol 175 Britannia. The first prototype of this outstanding design, planned in the light of B.O.A.C.'s requirements on long- and medium-range Empire routes, is expected to fly this summer. Some two years later the Corporation intends to put into service the first of 25 Britannias ordered from the drawing-board in July 1949. Centaurus engines were to have been fitted in the first new production aircraft, but progress with the Proteus turboprop enabled B.O.A.C. to announce, early in 1950, that piston engines

Civil application of the Blackburn and General Aircraft Universal Freighter (below) is largely dependent on the possibility of a military order. Four Bristol Hercules 730s power this 162ft-span prototype.



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would not, after all, be required. Employed in conjunction with a carefully planned aerodynamic design, the four powerful Proteus IIIs (each unit will deliver over 3,200 h.p. plus 800 lb thrust) will make the Britannia one of the fastest and most economical airscrew-driven airliners in the world.

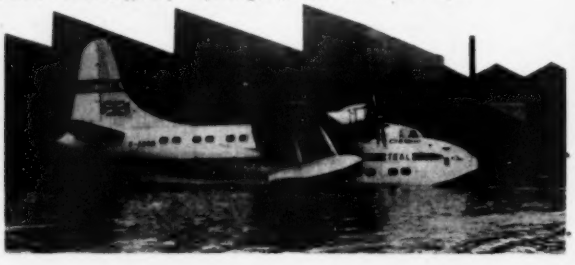
In appearance, the Britannia is orthodox, with low-placed, high-aspect ratio wing and a large single fin and rudder. Its wing-loading and power-loading are unusually low, however, and the take-off and landing characteristics are excellent. At a gross weight of 140,000 lb, for example, estimated take-off and landing distances are 3,700ft and 3,800ft—compared with distances of 7,000ft and 3,800ft, respectively, for the Stratocruiser at 145,800 lb. Four-wheel bogie-type main undercarriage-units are incorporated, and the turboprops will have reversible-pitch airscrews.

The fuselage will be pressurized to an equivalent of 6,000ft at operating heights up to 35,000ft. The Britannia's wide fuselage and track-mounted seats enable passenger accommodation to be

(Above) the prototype Avon-powered Series II Comet, which has been flying since February 16th, 1952. Orders for this more powerful, longer-range version already total 24. No details have yet been released. The Handley Page Hermes IV (below) is in service with B.O.A.C. and Airwork, Ltd.

(Left) the Hermes V, powered by four Bristol Theseus turboprops. A later version, the Vb, will have the much more powerful Proteus, a wing of increased span and correspondingly improved performance.

(Below) seen in the colours of Tasman Empire Airways, the Short Solent IV carries, typically, 42 passengers for 2,330 miles at 200 m.p.h.



varied at short notice. Fifty, 61 or 75 passengers in rows of four, five or six seats can be accommodated in three layouts envisaged for B.O.A.C., but the success of cut-rate services may encourage B.O.A.C. to take advantage of the Britannia's full capacity for 104 "tourist" passengers.

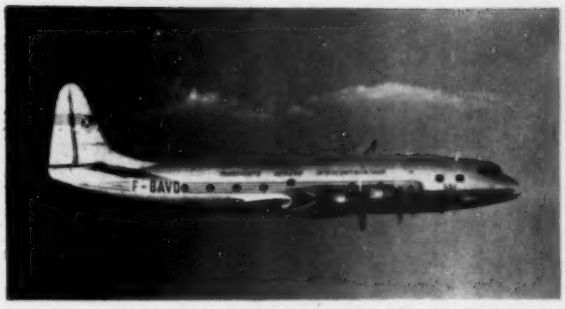
Span, 140ft; length, 114ft; wing area, 2,055 sq ft; design gross weight, 140,000 lb. Typical performance: 2,700 miles at 330 m.p.h. at 25,000ft with max. payload of 23,500 lb.

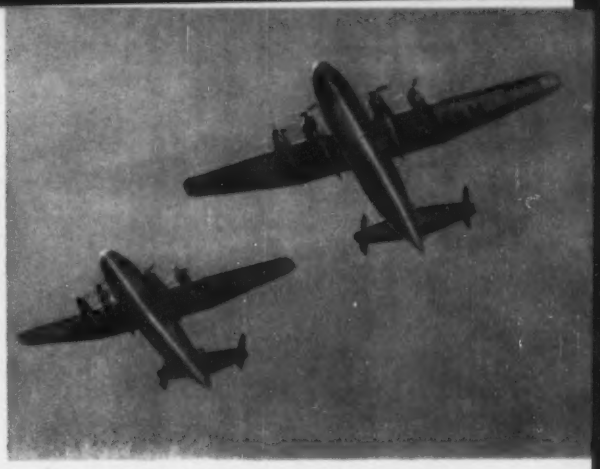
De Havilland Comet Series I. Conceived in 1946 and first flown in July 1949, the Series I Comet is the first jet airliner to enter service. Although its cruising speed of over 480 m.p.h. exceeds by over 50 per cent that of any other transport, the Comet is a highly competitive aircraft with orthodox handling characteristics. It is available in 48-seat or—as used by B.O.A.C. on the new London-Johannesburg service—36-seat form. On this route it has already been proved that passengers arrive at their destination fresh despite having flown for over 18 hours out of 24; the Comet's quiet, vibrationless cabin is, of course, responsible for this added improvement on accepted standards of airline service.

The Series I Comet is powered by four de Havilland Ghost turbojets each of which delivers 5,000 lb s.t.; these units have proved remarkably reliable and modest in their maintenance requirements. The wing-root mountings are very accessible and six man-hours are regarded as a liberal allowance for engine changing. In the course of two-and-a-half-years' development flying with the Comet it has been proved that the aircraft can be easily fitted into air-traffic patterns existing at home and overseas. This first version of the Comet is expected to prove very economical on stage-lengths of between 600 and 1,750 miles.

Span, 115ft; length, 93ft; gross weight, 105,000 lb; typical performance: 2,140 miles at 490 m.p.h. at 35-40,000ft with 12,000-lb payload and full allowances for head wind and diversion.

De Havilland Comet Series II. The second version of the Comet, powered by Rolls-Royce Avon turbojets, has a higher cruising speed (reported to be over 500 m.p.h.) and considerably increased range suiting it to longer stage-lengths. Eventual all-up weight of the Comet may be as high as 120,000 lb; the makers have not overlooked the possibilities of extending the fuselage to accommodate extra passengers, and design work to this end is in progress.





Above are two large French transports of contrasting design; (left) the S.E.2010 Armagnac high-speed pressurized airliner and (right) the capacious general-purpose Breguet 761, two of which are shown.

(Below) largest Italian transport is the Centaurus-powered Breda-Zappata 308. Only one was built.

Handley Page Hermes IV. The Hermes, which has been used by B.O.A.C. on the South African routes since 1950, was the first modern post-war airliner of British design to enter service. It is developed from the Hastings military transport, from which it differs mainly in having a considerably longer, pressurized fuselage and a nosewheel undercarriage. The power units are four Bristol Hercules 763 radial engines, each rated at 2,100 h.p. at take-off. Normal accommodation in the B.O.A.C. version is for 40 passengers but for high-density work the Hermes cabin can be adapted to take 64. In its present form the Hermes is regarded by many airline travellers as one of the most comfortable piston-engined aircraft in the world.

Span, 113ft; length, 96ft 10in; wing area, 1,408 sq ft; basic equipped weight, 55,350 lb; gross weight, 86,500 lb; max. speed, 355 m.p.h. at 20,000ft; typical performance: 3,330 miles at 242 m.p.h. (max. range speed) at 20,000ft with payload of 6,400 lb.

Handley Page Hermes V. Basically similar to the Hermes IV, this experimental version is powered by four Bristol Theseus 502 turboprops. Two prototypes have been delivered to the Ministry of Supply for a programme of research and development, in the course of which some remarkable performances have been obtained. The maximum cruising speed of 351 m.p.h. at 20,000ft is only 4 m.p.h. below the "placard" speed at 15,000ft. The Theseus turboprops each deliver an equivalent power of 2,820 h.p. for take-off, permitting a gross weight of 90,000 lb and giving an initial rate of climb of 2,325 ft/min. A typical performance with an 8,295-lb payload gives a range of 3,040 miles at 320 m.p.h. at 31,500ft. The second prototype Hermes V is equipped with double slotted flaps which give it a greatly improved take-off and landing performance.

Short Solent IV. Up to 80 passengers can be accommodated in the Solent flying-boat, although about half this number is normally carried. The principal operators of the Solent, at one time widely used by B.O.A.C. are Tasman Empire Airways, Aquila Airways and Trans-Oceanic Airways. As supplied to T.E.A. it carries 42 passengers in five separate cabins—two on the upper and three on the lower deck (which also accommodates dressing rooms, cocktail bar, promenade cabin and toilet). The power plants are four Bristol Hercules 733s.

Span, 112ft 9½in; length, 88ft 6½in; weight empty, 48,690 lb; gross weight 80,000 lb; typical performance: 1,760 miles at 190 m.p.h. with 39 passengers and 350 lb of freight.

Canadair Four. Known also as the Argonaut (B.O.A.C.) and the North Star (T.C.A.) the Canadair Four is a Canadian-built medium- and long-range transport which combines the airframe characteristics of the Douglas DC-4 and DC-6. It differs mainly from the American machines in having Rolls-Royce Merlin liquid-cooled engines—Mk 626 power-plants rated at 1,760 h.p. The fuselage, which can be equipped for 36-55 passengers, is pressurized to 8,000ft equivalent pressure at 20,000ft.

Canadairs are employed by T.C.A. on the North Atlantic route and by B.O.A.C. on services to South America and the Far East. Both companies are now adopting "cross-over" exhausts to reduce engine noise, and B.O.A.C. is already introducing the modified aircraft, the first of which was used on the recent Royal flights to and from Kenya. A more powerful version, the Canadair Five, used by the R.C.A.F. for crew training and as a V.I.P. transport, has 2,100 h.p. P. and W. R-2800 radials.

Span, 117ft 6in; length, 93ft 7½in; wing area, 1,457 sq ft; weight empty, 46,832 lb; gross weight, 82,300 lb; typical performance: 302 m.p.h. at 25,000ft at max. weight.

Bréguet 76-3 Provence. Fifteen of these French aircraft, large four-engined transports for high-density passenger work and heavy freighting, have been ordered for Air France and Air Algeria and the first two production machines are on service trials. The Provence has a double-decked fuselage with total freight or passenger capacity of 5,898 cu ft.

The designation 76-3 applies to Provences "off the line" from No. 4 onwards; the later aircraft embody detail refinements. Three versions will be available: (i) with capacity for eight passengers and freight on the upper deck and freight only on the lower, total cargo capacity being 30,000 lb; (ii) with accommodation for 54-59 passengers on the upper deck and 15,400-22,000 lb of freight on the lower; and (iii) with seats for 130 passengers.

Loading is facilitated by four large hydraulically operated doors beneath the rear fuselage, which are large enough to permit three trucks to load or unload at the same time. Mechanical hoists and overhead rail carriers feed both decks. The engines of the Provence are four 2,000 h.p. P. and W. R-2800s fitted with reversing airscrews.

Span, 140ft; length, 94ft 11in; wing area, 1,996 sq ft; weight empty, 55,890 lb; gross weight, 105,822 lb; cruising speed (55 per cent power at 9,840ft), 224 m.p.h.; still-air range, 2,367 miles.

S.N.C.A.S.E. 2010 Armagnac. The great effort which France has made to develop this impressive aircraft is, unfortunately, very unlikely to be rewarded by series-production; small numbers are spoken for by Air France and T.A.I., but production is scheduled to terminate this year. The largest aircraft type ever to enter service with any airline, the Armagnac is rather underpowered with four Wasp Majors installed Stratocruiser-fashion. The pres-

The Canadair Four—alias Argonaut or North Star—is seen here in the colours of B.O.A.C., who employ 22 of these Merlin-powered transports.

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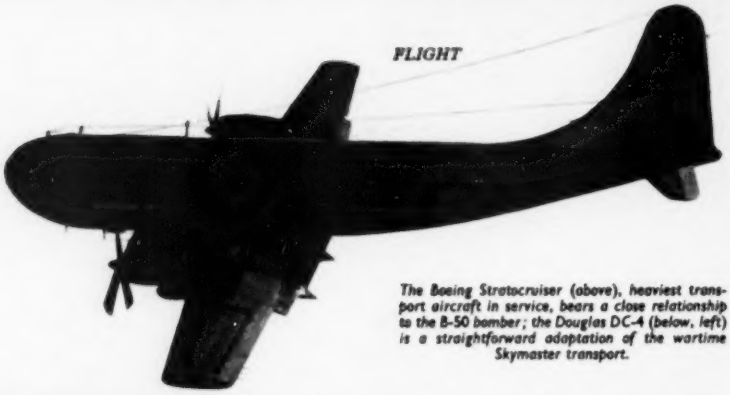


The Boeing Stratocruiser (above), heaviest transport aircraft in service, bears a close relationship to the B-50 bomber; the Douglas DC-4 (below, left) is a straightforward adaptation of the wartime Skymaster transport.

surized fuselage is at present usually fitted to seat either 84 or 107 in commendable comfort; performance, however, is insufficient to enable this fine aircraft to meet impending competition on anything like an equal footing.

Span, 160ft 7in; length, 129ft 11in; wing area, 2,542 sq ft; weight empty, 83,190 lb; gross weight, 165,000 lb; typical performance: 3,730 miles at 280 m.p.h. (50 per cent power) at 20,000ft.

Breda-Zappata Bz.308. Unpressurized but otherwise comparable in size, appearance and capacity with better-known large airliners, the Italian Bz.308 is powered by four Bristol Centaurus 568 engines, each delivering 2,500 h.p. and driving five-blade airscrews. Commercial application of this version is not foreseen, but the manufacturers have announced a plan for fitting the Bz.308 with more powerful engines (compounded Wright Cyclone of 3,250 h.p.) and a pressurized cabin. In present form the aircraft can carry 54 passengers in two separate compartments or 31 passengers and some 8,000 lb of freight.

Span, 138ft 2in; length, 110ft; wing area, 2,240 sq ft; weight empty, 60,600 lb; gross weight, 102,500 lb; cruising speed at 11,500ft, 267 m.p.h.; normal range, 3,730-3,975 miles.

Boeing Stratocruiser. Six versions of America's famous Stratocruiser, the heaviest civil airliner in service in the world, are in service with four separate airlines; they differ only in passenger accommodation. Normally about 60 passengers are carried—sometimes, on luxury services, even fewer—but with galley removed and extra seats installed the aircraft would be capable of carrying 104 passengers on high-density services; as yet, however, no operator has modified Stratocruisers for such work.

A typical example is B.O.A.C.'s Model 377-10-32, which has seats for 12 in the lounge on the lower of the two decks and for 60 on the upper; when sleeping accommodation is provided for 24 on the upper deck seats remain for 28. The "double-bubble" fuselage is fully pressurized to give sea-level cabin pressure at 15,000ft and an atmosphere equivalent to 5,500ft at 25,000ft. The upper deck accommodates the control cabin and the main passenger compartment, while on the lower are two cargo holds of 845 cu.ft. capacity, in addition to the lounge.

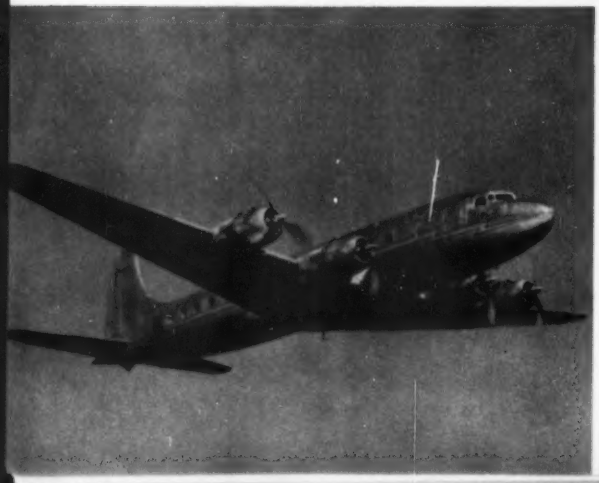
The power units, quickly interchangeable, are four P. and W. Wasp Majors, each rated at 2,800 h.p. (3,500 h.p. with water-injection at take-off). Other notable features of the Stratocruiser are its thermal de-icing equipment on all leading edges, horizontal-folding fin and rudder and power-boosted rudder control.

Span, 141ft 3in; length, 110ft 4in; wing area, 1,769 sq ft; weight empty, 83,500 lb; gross weight, 145,800 lb; max. cruising speed on 1,900 h.p. per engine, 340 m.p.h. at 25,000ft; range, 3,550 miles with 20,000 lb payload.

Douglas DC-4. Only 79 genuine post-war Douglas DC-4s were produced, but the designation is also applied to converted C-54 Skymasters, of which over 1,160 were constructed for the U.S. Armed Forces during the war. In commercial form the aircraft is normally equipped to carry 22-44 passengers. The power units are four P. and W. Twin Wasps, each delivering 1,450 h.p. for take-off.

Span, 117ft 6in; length, 93ft 11in; wing area, 1,457 sq ft; gross weight, 63,500 lb; max. cruising speed at 20,800ft, 227 m.p.h.; absolute range, 3,200 miles.

Recently introduced into service on the North Atlantic route, the Douglas DC-6B (right) is a "stretched" version of the post-war DC-6 pictured below. Deliveries of and orders for these two designs total approximately 250.



Douglas DC-6. One of the most successful large airliners in the world (175 were delivered), the DC-6 is a larger and more powerful version of the DC-4. The cabin, which is pressurized to an equivalent atmosphere of 8,000ft at a height of 20,000ft, can be fitted to carry from 26 passengers (sleeper version) to 70 (coach layout). The engines are P. and W. R.2800-CA 15s rated at 2,400 h.p. for take-off with water injection. Reversible airscrews are fitted.

Span, 117ft 6in; length, 100ft 7in; wing area, 1,457 sq ft; weight empty, 51,495 lb; gross weight, 97,200lb; cruising speed, 313 m.p.h. at 20,400ft; normal range, 3,820 miles.

Douglas DC-6A Liftmaster. The Liftmaster is a freight-carrying version of the DC-6, having an entirely new fuselage five feet longer than that of the DC-6. It is powered by four P. and W. R.2800-CB17 engines, each delivering 2,500 h.p. at take-off. The main cabin, which is pressurized to permit carriage of perishable goods at high altitude, is of constant cross-section and offers a total cargo-space of 5,000 cu ft. Large upward-

A Model 749A Lockheed Constellation of Air India, one of the 15 companies which operate this famous transport.

Larger and more powerful than its predecessors, the new Douglas DC-7 will be powered by four 3,250 Wright Turbo-Cyclones. A similarly powered version of the Model 1049 Super-Constellation (left) is expected to be in service by the end of this year.

hingeing doors are provided fore and aft of the wings, and the aircraft has a self-powered loading elevator capable of lifting 4,000lb from loading trucks to cabin floor.

Span, 117ft 6in; length, 105ft 7in; wing area, 1,457 sq ft; weight empty, 49,767 lb; gross weight, 106,000 lb; cruising speed, 311 m.p.h. at 20,600ft; normal range, 3,860 miles.

Douglas DC-6B. At present the "pinnacle" of Douglas development, the DC-6B shows up well in comparison with its contemporaries, both from performance and cost per ton-mile viewpoints. Very large orders are in hand for some six basic versions of the type, probably the largest single order being for a military derivative—the R6D for the U.S. Navy. Powered by CB-17 series Double Wasps aggregating 10,000 h.p.—driving Hamilton three-blade square-tipped airscrews—this latest "Six" can seat up to 92 in its 105ft pressurized fuselage. Present price amounts to some $1,200,000 per unit.

Span, 117ft 6in; length, 105ft 7in; wing area, 1,463 sq ft; weight empty, 54-56,000 lb; gross weight, up to 107,000 lb; typical performance: 4,000-mile range at 285 m.p.h. (45 per cent power) at 22,500ft.

Douglas DC-7. Yet another development of the original DC-4, the DC-7 is to be powered by compounded engines—four Wright Turbo-Cyclone 18s, each rated at 3,250 at take-off. With these economical engines and 6,600 U.S. gallons fuel capacity, the international version of the DC-7 will be capable of flights from New York to London, non-stop in either direction. Its fuselage is some three feet longer than that of the DC-6B and it will accommodate from 60-95 passengers according to seating arrangements. The first of 25 DC-7s ordered by American Airlines is scheduled to begin coast-to-coast operations in America on January 1st, 1954.

Span, 117ft 6in; length, 108ft 11in; wing area, 1,457 sq ft; gross weight, 122,200 lb; estimated max. cruising speed, 358 m.p.h. at 24,200ft. Estimated range at 20,000ft (international version), 5,175 miles.

Lockheed Constellation. Over 200 Constellations are in service with 15 airlines and many more are on order. Originally designed as a civil airliner in 1939-40, the aircraft first flew in January 1943 as a military prototype. Twenty had been completed for the U.S.A.A.F. by the end of the war and subsequent production machines were all completed as civil transports.

The current Model 749A Constellation is basically similar to the first civil Constellation but has more powerful Wright GR3350-BD1 engines (each rated at 2,500 h.p. for take-off), increased fuel capacity and a more luxurious interior. Various interior arrangements allow for total accommodation of from 44 to 68 passengers (as in the latest B.O.A.C. high-density versions). Beneath the floor of the main cabin are two freight compartments with a total capacity of 434 cu ft. Additional loads can be carried in the "Speedpak" metal pannier, which provides 400 cu ft of stowage space for a penalty of about 12 m.p.h. The fuselage is pressurized to an equivalent of 10,000ft at 23,800ft.

Span, 123ft; length, 95ft 11in; wing area, 1,650 sq ft; weight empty, 56,590-57,160 lb; gross weight, 107,000 lb; cruising speed at 23,000ft, 327 m.p.h.; normal range, 4,160 miles.

Lockheed Super Constellation. Ten airlines have already ordered the Super Constellation, which is designed for eventual conversion to turboprop power and has a new fuselage 18.4ft longer than that of the Model 749A. Three versions will be built; the 1049, with 2,500 h.p. R.3350-C 18-CA18; and the 1049B and 1049C, both of which will be fitted with four 3,250 h.p. Wright Turbo-Cyclone compound engines (the "B" model is a cargo transport with total capacity of 5,568 cu ft).

The first prototype of the model 1049 made its first flight on October 13th, 1950; by comparison with the 749A, from which it was converted, it has an increased all-up weight of 120,000 lb and greater interior capacity—for 92 passengers. Its cruising speed is 350 m.p.h. The compound-engined 1049C will have a take-off

The elegant Airspeed Ambassador (left), operating with B.E.A. under the class-name "Elizabethan," is becoming an increasingly familiar sight over Europe. The A.W. Apollo (above) is powered by Armstrong Siddeley Mamba turboprops; the D.H. Heron (below) has Gipsy Queen 30s.

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weight of 130,000 lb and its cruising speed at 20,000ft will be 324 m.p.h. In high-density form it will be capable of carrying 93-110 passengers.

K.L.M. have ordered nine Model 1049C Constellations, with delivery of the first scheduled for this autumn; these are expected to be the first compound-engined aircraft to enter airline service. Military versions on order for the U.S. Navy will have wing-tip and under-wing fuel tanks, increasing their capacity to some 8,600 U.S. gallons (practically twice that of the basic Constellation design). These tanks are likely to be adopted by civil Constellations when turboprop conversion takes place.

Span, 123ft; length, 113ft 7in; wing area, 1,650 sq ft; empty weight 72,000 lb; gross weight (L.1049C), 130,000 lb.

Consolidated Liberator. No bomber can ever become an efficient civil transport—for passengers, at least—without extensive re-design. While the Liberator was a most efficient bomber, and has also been operated successfully as a freight transport, the type has no place in the airlines of today. Several are still in service, however, and may still be seen in various parts of the world—almost entirely on cargo transport.

Span, 110ft; length, 66ft 4in; wing area, 1,048 sq ft; weight empty, 30,000 lb (approx.); gross weight, 56,000 lb; typical performance: range, 1,400 miles at 215 m.p.h. (60 per cent power) at 10,000ft with a load of 15,000 lb.

12,500—70,000 lb

Airspeed Ambassador. Known better to the travelling public by its B.E.A. class-name "Elizabethan," the Ambassador is the newest inter-city medium-stage airliner to enter service. The Corporation has taken delivery of several of the 20 ordered some four years ago, and the first scheduled Elizabethan service was flown last March on the London—Paris route.

Technically, the Ambassador is an advanced design, intended to achieve economy by high cruising speed on low power. An unusually wide range of cruising speeds—up to 312 m.p.h.—enables it to offer highly competitive services and to maintain schedules in severe headwinds. The B.E.A. version is equipped to carry 47 passengers. The Ambassador's cabin, wide, spacious and providing an unobstructed view, is pressurized to give an atmosphere equivalent to 8,000ft at 20,000ft.

Engines are two Bristol Centaurus 661 interchangeable power-plants developing 2,600 h.p. each and conferring a high degree of single-engined safety.

Span, 115ft; length, 81ft 4in; wing area, 1,200 sq ft; weight empty, 35,068 lb; gross weight, 52,000 lb; typical performance: 1,560 miles with payload of 7,800 lb at 280 m.p.h.

Armstrong Whitworth Apollo. Although no production orders for the Apollo have been announced, this medium-stage airliner has a performance well in excess of contemporary piston-engined machines and is of high technical interest. It is powered by four Armstrong Siddeley Mamba turboprops (each of 1,270 s.h.p. plus 350lb thrust) and was the second turboprop-powered airliner to fly—in April, 1949. The cabin can accommodate 26-41 passengers and is pressurized to 8,000ft equivalent at 25,000ft.

Span, 92ft; length, 71ft 5½in; wing area, 986 sq ft; weight empty, 29,900 lb; gross weight, 45,000 lb; normal cruising speed, 276 m.p.h. at 25,000ft; still-air range, 1,350 miles at 25,000ft.

Bristol 170. Characterized by its capacious fuselage with nose-opening doors, high wing and fixed undercarriage, the Type 170 Freighter has proved to be a popular workhorse at home and abroad—although the process of adoption was initially slow. Some 120 have now been delivered.

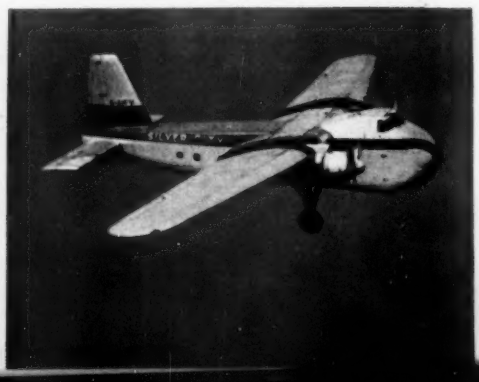
The latest general-purpose version, the Mk 31E, can be quickly adapted from a 32/48-seat airliner to a cargo-carrier of 2,260 cu ft capacity. In agricultural form, it can carry six tons of fertilizer, and as an ambulance it takes 28 litter patients.

An outstanding example of the specialized short-haul work to which the Freighter is so well suited is the cross-Channel car-ferry service of Silver City Airways, which air-lifted over 13,000 vehicles last year alone. This company has placed an order for development and construction of a new "long-nose" version of the 170 with increased passenger-and-cargo capacity.

Span, 108ft; length, 68ft 4in; wing area, 1,487 sq ft; weight empty,

Orders for the Handley Page Marathon feeder-liner have recently been announced by Union of Burma Airways and the West African Airways Corporation, in whose colours it appears below.

A Bristol 170 Freighter, one of nine at present in service with Silver City Airways; a new "long-nosed" version has recently been ordered by this company.



Vickers-Armstrongs' Dart-powered Viscount already promises to eclipse the reputation for service established since 1947 by its predecessor, the Viking (above). (Right) the first jet transport of the New World, Avro Canada's Derwent-powered Jetliner.

28,490 lb; gross weight, 42,000 lb; typical performance: 795 miles with 9,000 lb payload at 160 m.p.h.

De Havilland Heron. Developed from the famous Dove, the Heron is a four-engined light/medium transport intended primarily for feederline services. Engines are 250-h.p. ungeared, unsupercharged Gipsy Queen 30s driving D.H. constant-speed airscrews. The prototype and first production Herons had fixed landing-gear, simplicity being the design-theme throughout, but an alternative version with retractable wheels will appear this year. Cabin accommodation is for 14-17 passengers.

Span, 71ft 6in; length, 48ft 6in; wing area, 487 sq ft; weight empty, 7,960 lb; gross weight, 12,500 lb; cruising speed at 8,000ft, 160 m.p.h.; still-air range with 2,750-lb payload, 700 miles.

Handley Page (Reading) Marathon. Ordered for short/medium-range feederline work by B.E.A., West African Airways Corporation and Union of Burma Airways, the Marathon was originally designed by Miles Aircraft, Ltd., and first flew in 1946. The power-units are four 275-h.p. Gipsy Queen 70-2s driving constant-speed, fully feathering airscrews. The aircraft can maintain height on any two engines. Passenger accommodation varies from 18 to 22.

Span, 65ft; length, 52ft 11in; wing area, 498 sq ft; weight empty, 11,946 lb; gross weight, 18,000 lb; max. w.m. cruising speed, 200.5 m.p.h.; typical performance: 810 miles with 4,258-lb payload at 157 m.p.h.

Short Sandringham. This long-range flying-boat is a civil version of the Sunderland, differing only in minor structural respects and interior fittings and in profile of nose and tail. A typical example of the seven versions built is the Sandringham 4, as supplied to T.E.A., which is powered by four 1,200 h.p. P. and W. Twin Wasps and has accommodation for 30 day passengers (the Mk 6 for Norwegian Air Lines carries 37).

Span, 112ft 9¼in; length, 86ft 3in; wing area, 1,687 sq ft; weight empty, 41,370 lb; gross weight, 60,000 lb; typical performance: still-air range of 2,430 miles with 32 passengers at 175 m.p.h.

Vickers-Armstrongs Viscount. Most promising British airliner in the medium-range category, the Viscount has been ordered by B.E.A., Air France, Aer Lingus, and Trans-Australia Airlines. First deliveries—to B.E.A.—are scheduled for October next.

Production models differ from the Type 630 prototype, which flew first in July, 1948, in having a longer fuselage and extended wings—developments made possible by an increase (to 1,400 h.p. plus 365 lb thrust) in the power available from the Dart 504 turboprop. The Viscount can take off with any one of the four Darts out of action and has been demonstrated in "light" condition with three feathered.

Accommodation for 40-48 passengers is provided in the cabin of the Viscount, where pressure equivalent to 8,000ft is maintained at 30,000ft. Large, double-elliptical windows serve as escape hatches, and the incorporation of bag-type tanks (total capacity 1,720 gall.) is a further safety measure. The prototype Viscount,

which was the first turboprop-powered airliner to fly, also gained the distinction, in the summer of 1950, of being the first gas-turbine aircraft in the world to carry fare-paying passengers on a scheduled service—the B.E.A. London-Paris route.

Span, 94ft; length, 74ft 6in; wing area, 963 sq ft; weight empty, 32,100 lb; gross weight, 40,000 lb; typical performance: (Type 701), 1,000 miles with payload of 8,200 lb at 300 m.p.h.

Vickers-Armstrongs Viking. Production of the Viking ceased in 1949, by which time 161 had been built. The first prototype, developed from the Wellington and employing its geodetic wings and tailplane, appeared in 1945; nearly all subsequent production aircraft, however, have metal-covered, re-designed wings and tail. The major civil version (and the standard aircraft on nearly all B.E.A. overseas routes until recent

Two French medium transports, the ageing Languedoc 161 (below) and the SO.30 P, of post-war design, powered by two P. and W. Series CA-18 Double Wasps.

months) is the Mk 1B; this has 1,690 h.p. Bristol Hercules 634s and a longer fuselage with capacity for three extra passengers. Standard interior layouts are for 24 or 27 passengers.

Span, 98ft 3in; length, 65ft 2in; wing area, 882 sq ft; empty weight, 23,000 lb; gross weight, 34,000 lb; typical performance: still-air range of 1,130 miles at 210 m.p.h.

Avro Canada Jetliner. Second pure-jet airliner to take the air—the date of its initial flight was August 10th, 1949—the C.102 Jetliner represents a bold private-venture attempt to render obsolete all existing inter-city airliners. That the aircraft was in some respects premature in no way detracts from the technical excellence of its design and construction, and only Avro Canada's

(Above) An Italian S.M. 95 in the service of S.A.I.D.E. (Egypt). (Below) the Yak 16, Russian feederliner, accommodates ten passengers.

Of tri-motor layout, the Fiat G.212 (above) is powered by Twin Wasps. (Below) Up-to-date Russian—an IL 12 of LOT (Polish Airlines).

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rearmament commitments "froze" the possibility of at least limited production.

The Jetliner is powered by four 3,500-lb thrust Rolls-Royce Derwent 5 turbojets mounted in paired circular nacelles. Accommodation for 40-50 passengers is provided by the pressurized cabin, which maintains an equivalent atmosphere of 6,000ft at 35,000ft.

Span, 98ft 11in; length, 82ft 9in; wing area, 1,157 sq ft; gross weight, 60,000 lb; speed, 450 m.p.h.

Bréguet 89 Mercure. Powered by two Bristol Hercules 739 engines, the French Mercure is a freighter of unusual configuration. The entire rear fuselage hinges to port, giving complete access to the 32ft x 8ft x 7ft cargo hold, which has an overhead loading trolley with an extension for direct loading from trucks. The Mercure has a high-placed wing, and the main units of the nosewheel undercarriage fold into the underslung nacelles.

Span, 100ft 5in; length, 70ft 2in; wing area, 1,090 sq ft; weight empty, 22,330 lb; gross weight, 39,600 lb; typical performance: 621-mile range against 31.5 m.p.h. head-wind (with 1 hr fuel-reserve); cruising speed at 4,920ft, 186 m.p.h.

Marcel Dassault M.D.315 Flamant. The Flamant (two 580-h.p. Renault 125 air-cooled vee engines) is a multi-purpose light transport designed mainly for French "colonial" service. It has accommodation for up to 10 passengers. 300 are on order.

Span, 67ft 10in; length, 41ft; wing area, 508 sq ft; weight empty, 9,350 lb; gross weight, 12,760 lb; cruising speed, 186.3 m.p.h.; range, 745 miles.

Fouga C.M.100 and 101R. Evolved by fitting two 580-h.p. S.N.E.C.M.A. engines to the C.M.10 glider, the Fouga C.M.100 is a general-purpose short-haul transport capable of carrying some 4,500 lb of freight or up to 15 passengers. The C.M.101R, to which the following figures apply, is of similar construction but has two 240 lb s.t. Piméné turbojets, nacelle-mounted, to increase take-off performance.

Span, 87ft 7in; length, 58ft 8½in; wing area, 774 sq ft; weight empty, 12,469 lb; gross weight, 16,060 lb; cruising range, 310 miles at 152 m.p.h. against 31 m.p.h. head-wind.

S.N.C.A.S.E. 161 Languedoc. Although first flown in 1939, the Languedoc was not put into production until after the liberation of France. Forty were delivered to Air France, which company has utilized them on medium- and short-range routes to the extent of 133,000 flying hours (No. 2 machine has logged 6,000). The Languedoc's main cabin has standard accommodation for 33 passengers in 11 rows of three. The power-plants are four P. and W. Twin Wasps (1,200 h.p. each at take-off).

Span, 96ft 5in; length, 79ft 7in; wing area, 1,198 sq ft; weight empty, 27,890 lb; gross weight, 45,364 lb; normal range, 1,678 miles; cruising speed, 233 m.p.h. on 65 per cent power at 7,550ft.

S.N.C.A.S.O. 30P Bretagne. Two passenger versions of the Bretagne have been produced, powered with, respectively, 2,000 and 2,400 h.p. variants of the P. and W. R-2800 engine. The Bretagne was designed during the war as a medium-range intercity and colonial airliner, and is capable of carrying 30-43 passengers. A freighter development, the S.O. 30C, has large clamshell doors under the rear fuselage for the strengthened cargo-hold.

Span, 88ft 2in; length, 62ft 2in; wing area, 927.5 sq ft; gross weight, 43,000 lb; cruising speed, 267 m.p.h. on 50 per cent power at 16,000ft; range, 746 miles.

Fiat G.212. Earlier Italian transports are recalled by the tri-motor layout of the interim-type post-war G.212. The engines are 1,050 h.p. Twin Wasps driving feathering airscrews. Internal arrangements vary from a 26-passenger luxury layout to a 34-seat high-density version.

Span, 96ft 4in; length, 75ft 7in; wing area, 1,252 sq ft; weight empty, 24,640 lb; gross weight, 39,600 lb; cruising speed, 199 m.p.h. on 60 per cent power at 9,840ft; max. range, 1,710 miles.

SAIA-Marchetti S.M.95. Only four-engined Italian airliner to enter post-war airline service, the S.M.95 has accommodation for 30 passengers on normal medium-range operations. Capacity may be increased to 38 for short-haul work. Mixed wood-and-

A Saab Scandia, Sweden's DC-3 replacement, in the colours of S.A.S.

metal construction is employed. The S.M.95 is powered by four 1,050 h.p. P. and W. Twin Wasps.

Span, 112ft 5in; length, 81ft 3in; wing area, 1,380 sq ft; weight empty, 31,950 lb; gross weight, 52,870 lb; cruising speed, 215 m.p.h. on 60 per cent power at 11,500ft.

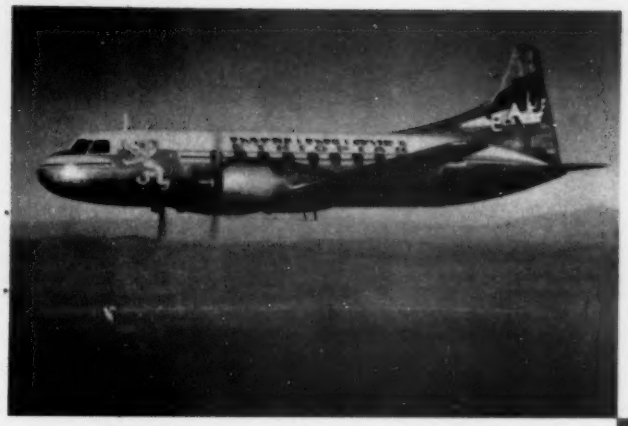
Breda-Pittoni B.P.471. Powered, like most other Italian transports, by 1,050 h.p. Twin Wasps, the B.P. 471 is a medium-range twin-engined aircraft designed to meet I.C.A.O. requirements. Its standard interior arrangement is for 18 passengers and, in addition, two-piece freight-loading doors are provided abaft the wings. The undercarriage is of nosewheel type, with main units retracting into underslung nacelles. The high-position wing is of inverted-gull configuration.

Span, 75ft 5in; length, 57ft 5in; gross weight, 22,046 lb; cruising speed, 256 m.p.h.; cruising range, 1,243 miles at 245 m.p.h.

Ilyushin IL 12. Standard medium-range transport of the Soviet and satellite airlines, the Russian IL 12 is a modern twin-engined design which compares not unfavourably in performance and workmanship with contemporary Western types. The power-units are 1,775 h.p. Ash radials driving feathering metal airscrews. From 27-32 passengers are carried in the non-pressurized cabin.

Span, 104ft; length, 69ft 10¾in; empty weight, 19,850 lb; gross weight, 38,000 lb; cruising speed at 8,220ft, 217 m.p.h.; range with 32 passengers and baggage, 777 miles.

Yakovlev Yak 16. The Yak 16, powered by two Ash-21 radials



(Left) A Convair 240 of Ethiopean Airlines and (above) a Curtiss C-46 Commando, a mainstay of the smaller U.S. operators. The DC-3 (below) is the most ubiquitous airliner in the world: nearly 11,000 were built, most of them as military transports.

developing 750 h.p. each, is believed to be the best Russian feederliner. It has accommodation for 10 passengers in two single rows of five seats.

Span, 65ft 7in; length, 47ft 6in; weight empty, 11,000 lb; gross weight, 14,000 lb; cruising speed at 5,600ft, 180 m.p.h.; range, 620 miles.

C.A.S.A. 201 Alcotan. Spain's first "twin," the Alcotan is a feederliner and small medium-range transport with capacity for 10 passengers. There are two versions—one with 475 h.p. Armstrong-Siddeley Cheetah engines, the other with 500-h.p. Spanish-built units—Elizalde Siro-VIIAs. Figures apply to the former version.

Span, 60ft 4in; length, 45ft 3in; wing area, 450 sq ft; weight empty, 7,830 lb; gross weight, 11,230 lb; cruising speed, 155 m.p.h.; range, 621 miles.

C.A.S.A. 202 Halcon. More powerful, 750-h.p. Elizalde radials are fitted in the new Halcon 14-passenger transport. Of orthodox layout, the Halcon has a span of 70ft and gross weight of 16,500 lb. Cruising speed at 70 per cent power is estimated as 186 m.p.h.

Saab-90 A-2 Scandia. Designed in Sweden in 1944 as a replacement for the DC-3, the Scandia first flew in November, 1946. The type has since been put into service by S.A.S. and the Brazilian V.A.S.P. airline. Production of Scandias has now been restricted by the manufacturers' preoccupation with defence orders

Two standard interior layouts are used—for 24 or 32 passengers; conversion from one layout to the other can be accomplished in a matter of 30 minutes. Comparable with the Russian IL 12 in size, function and appearance, the Scandia likewise exhibits orthodox but up-to-date design trends. The 1,400 h.p. P. and W. R-2180-EIs were specially designed for the Scandia.

Span, 91ft 10in; length, 69ft 11in; wing area, 922 sq ft; weight empty, 21,960 lb; gross weight, 35,280 lb; cruising speed at 10,000ft, 242 m.p.h.; max. range at 10,000ft, 1,560 miles.

Convair CV-240. Familiarly known as the Convair-Liner, the model 240 has been sold to over a dozen airlines; total production at present amounts to some 205 units, which must represent about $90,000,000—largely responsible for putting Convair well "in the black" and amply repaying development costs of the type. Powered by CA-18 series Double Wasps, with an exhaust-assisted cooling system (claimed to add some 12 m.p.h. to the cruising speed), the model 240 was designed at the end of the war as a DC-3 replacement and was certificated in 1947. In some versions an integral stairway on the starboard side of the nose expedites passenger handling, while other models—those of Trans-Australia Airlines for example—have a retractable stairway under the tail in addition. Full pressurizing and air conditioning is installed, while nearly all aircraft have reversing airscrews. The standard seating arrangement provides 10 rows of four seats each.

Span, 91ft; length, 74ft 8in; wing area, 817 sq ft; empty weight, 27,682 lb; gross weight, 41,790 lb; typical performance: range 920 miles at 272 m.p.h. at 16,000ft with payload of 8,150 lb.

Convair CV-340. "Stretching" the Convair-Liner has produced the Model 340, an airliner conventional in appearance but notable in both performance and efficiency. Chief structural changes are the increase in span, length and dihedral, the greatly increased tankage and the modified landing gear with larger tyres and long-stroke legs. The Double Wasps are of CB-16 series, mounted 7in further forward than on the 240. Unit price of the 340 is $630,000; some hundred are at present on order, the first batches being as follow: United Air Lines 30, Braniff 20, Continental 7, Hawaiian 4, Delta 10; numerous specially-equipped 340s are also being built for business houses, the first such examples being for the Arabian-American Oil Co.

Span, 105ft 8in; length, 80ft 2in; wing area, 920 sq ft; weight empty, 29,372 lb; gross weight, 45,000 lb; typical performance: range 1,000 miles at 292 m.p.h. at 20,000ft with payload of 7,700 lb.

Latest in the Convair-Liner series, the very efficient 340 has greatly increased range, and capacity for four extra passengers.

Pictured at Oakes Field, Nassau, is a Bahamas Airways Canso (passenger-carrying amphibian version of the Catalina).

While the Martin 2-0-2 was the first post-war U.S. civil transport (that shown is a 2-0-2A) the Super DC-3 (below) is a rebuilt basic design of 1930.

Rewarding numbers of Martin 4-0-4s (above) have been built. The Lodestar (below, in the livery of E.A.A.C.) is invaluable to many operators, but will soon have to give way to more modern aircraft.

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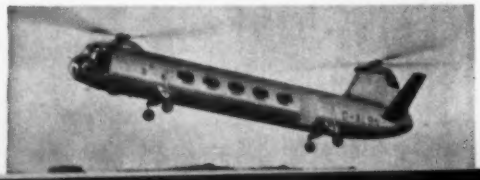
Convair Turbo-Liner. Although only one example of the type is flying—and that purely on experimental work—the Turbo-Liner deserves a mention as having been the first gas-turbine-powered transport of American design. The present example was once a standard model 240 which was purchased by the Allison division of General Motors for use as a test-bed for the T-38 turboprop; much use has also been made of the aircraft as an operational test vehicle for fundamental turbine-transport research. The high-pressure T-38 units, of some 2,750 h.p. each, drive four-blade Aeroproducts airscrews and are each fed from a large intake above the cowling.

The Turbo-Liner is similar in general dimensions and weights to model 240. Typical performance: cruising speed, 310 m.p.h. at 25,000ft; initial rate of climb, 1,940ft per min.

There is nothing else quite like the Auster Ambulance/Freighter.

Bristol 171 Mk.3 (above) and Bristol 173 (prototype, below).



Convair Canso. Examples of this familiar amphibian are still to be found on both freight and passenger work, particularly in Canada, South America, and the Far East. Seating can be provided for up to 22 passengers. Similarly powered to the DC-3 with two Twin Wasps, the Canso does not present speed as a characteristic; range, duration, seaworthiness and the ability to handle heavy and bulky loads more than make up for the deficiency.

Span, 104ft; length (usually), 68ft 7in; wing area, 1,400 sq ft; weight empty, about 19,000 lb; gross weight, 30,500 lb; typical performance: range of 3,000 miles at 125 m.p.h. at 10,000ft with payload of 4,400 lb.

Convair Catalina. The foregoing applies equally to the "Cat," from which the Canso was developed. Not being fitted with landing gear, the Catalina can carry rather heavier loads than can the amphibian; general performance is, however, much the same. The type is found based as far apart as Iceland and Thailand and will doubtless continue to be seen for at least five more years.

Curtiss Commando. This bulky aircraft is associated with the American "non-sked" operators, for whom it is a standard work-horse. Numerous scheduled services are also flown by Commandos, in many parts of the world; two large users of the type are Slick Airways, of San Antonio, Texas, and the Flying Tiger Line, of Los Angeles. Unfortunate accidents have resulted in protracted litigation in the U.S.A. concerning the whole future of "non-sked" operations; a by-product of this has been a reduction in the certified gross weight for the Commando (from 45,000 lb) to a figure (quoted below) which has been pronounced as uneconomic by several operators affected. Clearly, however, there is nothing fundamentally wrong with the aircraft and some hundreds are daily in use with high utilization figures. Power is provided by two Cyclone 14s giving up to 3,400 h.p. between them; passenger seating is normally restricted to 40, but some Commandos have certainly carried as many as 55 on occasions.

Span, 108ft 1in; length, 76ft 4in; wing area, 1,360 sq ft; weights (typical), empty, 29,500 lb; loaded, 40,000 lb (U.S.A.) or 45,000 or 50,000 lb. Typical performance: range of 1,600 miles at 220 m.p.h. at 10,000ft with 12,000 lb payload.

Douglas DC-3 and derivatives. A book could be (and, we hope, will be) written about this most ubiquitous of all transports. Some are in daily use with upwards of 40,000 hr in their log-books, and total production of the type (excluding those built in the U.S.S.R. and Japan) exceeded 10,000—several thousand of which are still in use, mainly on scheduled airline services. Engineering features hardly need be described, but there exist several modified versions which are worthy of mention.

British European Airways will shortly have converted their entire passenger DC-3 fleet to Pionair standard; this involves a rebuilding of the cockpit for two-man crew operation, with British equipment used throughout. Further changes in the Pionair include the use of a very light, comfortable double seat, bringing the accommodation up to 32 passengers, and the installation of a built-in stairway on the downward-folding cabin door.

Other DC-3 "mods" include the B.E.A. installation of Dart 504 turboprops on two freighters to gain operating experience with

the Viscount engine, and the DC-3 in France with a Palas auxiliary turbojet attached to the belly. A pressurized DC-3 has been delivered by Scottish Aviation to Bharat Airways, and the Super DC-3, described below, is available to extend the life of aircraft at present in service. Most DC-3s in service are Twin Wasp powered; usual seating is for 21 passengers.

Span, 95ft; length, 64ft 6in; wing area, 987 sq ft; empty weight (approx.) 16,800 lb; gross weight (C.A.A.), 25,200 lb; typical performance: 1,500 mile range at 190 m.p.h. with a payload of 6,500 lb.

Douglas Super DC-3. This conversion is so extensive that it involves return of the aircraft to the Douglas company; cost would also appear to have prevented it from becoming popular. Apart from R4D-8s for the U.S. Navy, the type is unlikely to be seen in large numbers, Capital Airlines, we believe, being the only domestic U.S. users.

Span, 90ft; length, 67ft 8¼in; gross weight, 31,000 lb. Typical performance: range of 1,400 miles at 240 m.p.h. at 10,000ft with 7,000 lb payload.

Lockheed Electra. The model 10 Electra dates from 1935; a few are still in use, with L.A.N. (Chile), N.Z.N.A.C. (N.Z.), South Coast and MacRobertson-Miller Airways (both Australia), and VARIG and DETA (Brazil and Portuguese East Africa).

Lockheed 12. A faster and slightly smaller Electra, the "twelve" is used by Pacific Northern Airlines (Alaska) and other small operators. Wasp Juniors provide the power as on the Electra.

Lockheed 14. Although of pre-war design, many "14s" are now converted Hudson bombers. Variously powered by Twin Wasp, Hornet, and Cyclone radials, they usually carry about 14 passengers at a good cruising speed; typical operators are East-West Airlines (Australia) and Canadian Pacific Air Lines.

Lockheed Lodestar. Faster than any of its contemporaries, this forebear of the Constellation is in service in all continents, and there is not yet available any cheap replacement with a matching performance. Subject to the same power-plant variation as is the model 14, the type is particularly well known with E.A.A.C., C.P.A.L., and National Airlines.

Span, 65ft 6in; length, 49ft 10in; wing area, 551 sq ft; weight empty, 12,075 lb; gross weight, 18,500 lb. Typical performance: range 1,300 miles at 220 m.p.h. with payload of 4,500 lb.

Martin 2-O-2. First post-war transport to be certificated in the U.S.A. (August, 1947), the 2-O-2 would appear to owe little to any previous design, but to be a bold attempt at a DC-3 replacement. Powered by two CA-18 series Double Wasps, the Martin is unpressurized. The 36 or 40 passengers enter via a power-operated rear loading ramp; double-slotted flaps are fitted, as are reversing airscrews. Equipment is typical of modern airliner practice. Total production was 31, of which 25 originally went to N.W.A.; California Central and two South American operators use the 2-O-2, as well as Trans-Ocean and Japan Air Lines. There is also a re-engined version (series CB-16 engines) designated 2-O-2A, a number of which went to T.W.A.

Span, 93ft 3in; length, 71ft 4in; wing area, 867 sq ft; weight empty, 26,930 lb.; gross weight, 39,900 lb. Typical performance: range 700 miles at 237 m.p.h. at 12,000ft with payload of 10,520 lb.

Martin 4-O-4. Basically a pressurized 2-O-2, large numbers of this transport are in service, chiefly with E.A.L. (as Silver Falcons) and T.W.A. Data everywhere shows a slight improvement on the 2-O-2, the operating performance being exhaustively analysed elsewhere in this issue.

Span, 93ft 3in; length, 74ft 7in; weight empty, 27,799 lb; gross weight, 42,750 lb; typical performance, range 900 miles at 255 m.p.h. at 18,000ft with 9,500 lb payload.

UNDER 12,500 lb

Airspeed Consul. Starting life as a converted Oxford, most Consuls were built in 1946 and 1947 as civil types right from the start—thus the wheel has turned the familiar full circle, the Oxford having been a military trainer version of the pre-war civil Envoy. (Turning the wheel yet further we find there is now a military Consul!) Usual power plants are 395 h.p. Cheetah 10s.

Span, 53ft 4in; length, 35ft 4in; weight empty, 6,047 lb; gross weight,

Approximately 330 Doves are in use; this one is Burmese.

This Brazilian Prince typifies the world-wide demand for the aircraft.

Gibraltar Airways (an associate of B.E.A.) operate this D.H.89A Rapide.

The big Leonides-powered Pioneer here shows its slots and flaps.

Quite large numbers of Sealands are beginning to be exported.

Both Westland-Sikorsky S-51 (below) and S-55 (left) are available to sterling-area purchasers; tooling-up for the S-55 is proceeding apace.

Beaver (above) and Otter (below) are both "winning" designs from de Havilland Aircraft of Canada, Ltd.

A D.H. (Australia) Drover, seen over Sydney Harbour.

This Renault-powered S.O.95 Corse is No. 42 off the line.

Two designs—one purpose: the all-wood Macchi MB-320 (above) and the all-metal Beech Twin Bonanza (below).

More than 350 Bell 47s are in service in many parts of the world; this civil 47D-1 (right) is carrying mail for Helicopter Air Service of Chicago.

Quite a number of Goose amphibians are still to be found; the example below is run on scheduled routes by Bahamas Airways, a wholly-owned subsidiary of B.O.A.C.

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8,250 lb. Typical performance: range 700 miles at 150 m.p.h. with payload of 1,500 lb.

Auster Ambulance/Freighter. Capable of carrying bulkier loads than any other aircraft of its size, the Bombardier-powered model B.4 Ambulance/Freighter is believed to be arousing interest in many parts of the world, particularly by reason of its suitability for many different purposes, both civil and military. Production is getting under way.

Span, 37ft; length, 24ft 8in; wing area, 190 sq ft; weight empty, 1,642 lb; gross weight, 2,600 lb. Typical performance, range of 300 miles at 105 m.p.h. with payload of 550 lb.

Avro Anson. Quite a large number of this faithful old type are still in service, and several sub-types are in use, the majority being converted Mk I or Mk V or VI (Canadian). When used as a transport, the Anson usually seats up to eight; other aircraft are employed as radio and navigation trainers.

Span, 56ft 6in; length, 42ft 3in; weight empty, 6,576 lb. gross weight 10,400 lb. Typical performance: range 610 miles at 134 m.p.h. with payload of 1,590 lb.

Bristol 171. Although this fine helicopter is principally being developed for military purposes, it is obviously an attractive proposition to certain civil operators. Seating four or five, the 171 is powered by an Alvis Leonides radial.

Main rotor diameter, 48ft 7in; fuselage length, 46ft 2in; weight empty, 3,630 lb; gross weight, 5,200 lb. Typical performance: range 310 miles at 105 m.p.h. with payload of 932 lb.

Bristol 173. Primarily designed for the transport of 13 passengers over medium ranges, the Type 173 helicopter makes use of two identical "handed" rotors each driven by an Alvis Leonides; a synchronizing shaft enables either engine to drive both rotors, if necessary. An 18-seat variant follows the prototype 173. B.E.A. are known to be interested.

Main rotor diameter, 48ft 7in; overall length (blades folded), 78ft 2in; fuselage length, 55ft 2in; empty weight, 7,424 lb; gross weight, 10,600 lb. Typical estimated performance: range 440 miles at 100 m.p.h. with payload of 1,500 lb.

De Havilland Dove. Three hundred and thirty Doves are at present in use and production is proceeding; orders have been received from the U.S.A., in which country a number of examples are already in use. The type is available in commercial, executive, survey, ambulance, pest-spraying and "convertible" models; ordinary airline Doves seat up to 11. The series 70 Gipsy Queens drive reversing airscrews.

Span, 57ft; length, 39ft 4in; weight empty, 5,625 lb; gross weight, 8,500 lb. Typical performance: range 500 miles at 180 m.p.h. with payload of 1,700 lb.

De Havilland D.H. 86B. One of these stalwart four-engine aircraft is in service with Lancashire Aircraft Corporation and two more with PLUNA (Uruguay); basically an enlarged Rapide, the type was once in service with many airlines, including Imperial Airways.

De Havilland D.H. 84 Dragon. Qantas Empire Airways (with eight in service) and Trans-Australia Airlines are the largest users of this patriarch of light transports. Powered by two Gipsy Majors, the Dragon was much faster than its contemporaries of 1933.

De Havilland D.H. 89 Dragon Rapide. One of the most widely used of all aircraft, the Rapide is still in service with civil operators on all six continents. Two Gipsy Sixes provide a useful performance, which is allied to a very simple and easily serviced airframe. Airline Rapides usually seat 8; B.E.A. operate 20, which are known as the "Islander" class.

Span, 48ft; length 34ft 6in; gross weight, 5,550 lb. Typical performance: range 495 miles at 130 m.p.h. with a payload of 1,290 lb.

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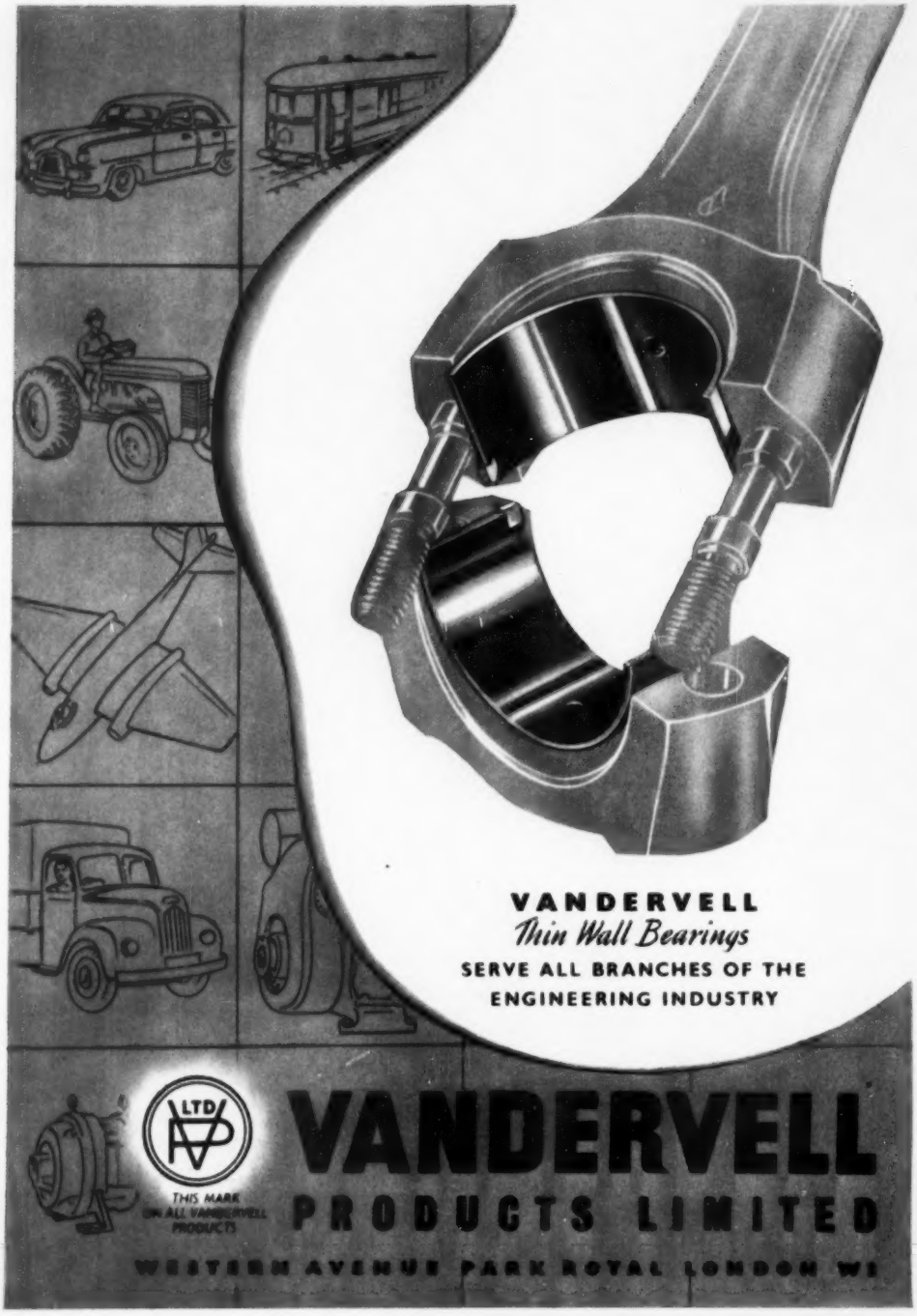
HANDLEY PAGE

RADLETT LONDON READING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COMMERCIAL AIRCRAFT TODAY . . .

D.H. 85 Fox Moth. Although the type is just 20 years old, Fox Moths are still to be found in Canada, Africa and New Zealand, while at least two are used for joy-riding work in this country. Gipsy Major-powered, this 3/4-seat biplane perpetuates the once-common practice of placing the pilot in a separate cockpit above the main cabin; today most Fox Moths provide him with a perspex canopy.

Percival Prince. A private venture, the Prince is proving outstandingly successful in widely differing civil and Service rôles. As a feederliner from 8 to 12 seats are provided—with considerable toilet and baggage space—while executive, ambulance and pest-control versions are also available. The M.C.A. are taking delivery of three very fully equipped models for radio and radar calibration work, while the P.54 Survey version is also proving deservedly popular. All are powered by the efficient Leonides radial of 550 h.p.

Span, 56ft; length, 42ft 10in; weight empty, 7,364 lb; gross weight, 11,000 lb. Typical performance: range 650 miles at 170 m.p.h. with 1,700 lb payload.

Scottish Aviation Prestwick Pioneer II. Developed from a Gipsy-Queen-powered A.O.P., the Leonides-Pioneer is a comparatively big aircraft, yet can land almost anywhere that a helicopter can. These qualities have interested several Service and civil operators and limited production is being undertaken.

Span, 52ft 6in; length, 34ft 7in; weight empty, 3,850 lb; gross weight, 5,400 lb. Typical performance: range 400 miles at 120 m.p.h. with 1,280 lb payload.

Westland-Sikorsky Helicopters—These aircraft are considered with others of basically American design on this page.

De Havilland D.H.A.-3 Drover. Like the Heron, the Drover has been described as a simplified Dove, devoid of hydraulics and electrics, but it has three Gipsy Major 10s instead of four Queen 30s. It seats six to eight passengers, has a payload of some 1,500 lb and cruises at 140 m.p.h. In ambulance form it has been adopted in small numbers for Australia's "flying doctor" service.

De Havilland Canada Beaver: Enhancing the reputation built up by the D.H.C.1 Chipmunk, the D.H.C.2 is a most rugged and capacious aircraft into which the experience of many years' bush flying has been built. Present production is one per day (most for U.S.A.F. and Army) and includes wheel, ski and float versions. A Wasp Junior is standard power and seating can be arranged for up to eight.

Span, 48ft; length, 30ft 3in; empty weight, 2,775 lb; gross weight, 4,650 lb. Typical performance: range 480 miles at 140 m.p.h. with 1,000 lb payload.

De Havilland Canada Otter. Fully described in *Flight* of April 11th, 1952, the Otter combines remarkable slow-flying properties with great capacity. Powered by a Wasp, this promising transport can seat 14 and will probably sell at about $65,000.

Span, 58ft; length, 42ft; weight empty, 4,165 lb; gross weight, 7,200 lb. Typical performance: range 500 miles at 150 m.p.h. with 2,000 lb payload.

C.C.F. Norseman. Originally designed by Noorduyn Aviation (now defunct) in 1936, this massive, Wasp-powered bush-transport is popular in Canada, but is little used elsewhere. Seating up to nine, the Mk V is the standard modern version; the makers, the Canadian Car and Foundry Co., have a project for a Mk VII.

Span, 51ft 8in; length, 32ft 4in (landplane): weight empty, 4,250 lb; gross weight, 7,400 lb. Typical performance: range 400 miles at 130 m.p.h. with 2,100 lb payload.

S.N.C.A.S.O. 95 Corse II. Descended from the S.O. 90 prototype built in unoccupied France in 1942, the Corse II is in full production for various domestic operators. Bulkier and much heavier than the Dove, this fast aircraft seats up to 13 and is powered by two 590 h.p. Renault inverted-vee 12s.

Span, 59ft; length, 40ft 5in; weight empty, 8,863 lb; gross weight, 12,346 lb. Typical performance: range 720 miles at 190 m.p.h. with 1,500 lb payload.

Macchi M.B. 320. Ordered by E.A.A.C., this attractive Italian all-wood six-seater is powered by two 185 h.p. Continentals. Its nearest parallels are the Morane 700 series and the bigger Twin Bonanza.

Span, 42ft 8in; length, 28ft 4in; weight empty, 3,285 lb; gross weight, 4,960 lb. Typical performance: range 600 miles at 160 m.p.h. with 1,000 lb payload.

Piaggio P.136. This unusual amphibian is rather like a twin-engined Seabee; various engines of around 200 h.p. have been installed, driving pusher propellers. Five seats are typical; the type is in limited production, chiefly for the I.A.F.

Span, 43ft 11in; length, 35ft 5in; weight empty, 3,750 lb; gross weight, 5,500 lb. Typical performance: range 400 miles at 145 m.p.h. with 950 lb payload.

Aero Commander 520. Now in production, America's Commander 520 is a high-wing, 6/7-passenger feederliner powered by two 240 h.p.Lycomings. It has been taken off, flown and landed at maximum weight (4,800 lb) with its port airscrew removed. Spanning 43ft, it has a cruising speed of 197 m.p.h. on 70 per cent power at 10,000ft and a range of 850 miles.

Beech Twin-Bonanza. Powered by a pair of 260 h.p. Lycomings, the Twin-Bonanza is a six-seat "executive" transport; over 100 have been ordered. It has a span of 45ft 3in and weighs 5,500 lb loaded. Typical performance: 985 miles on 65 per cent power giving 190 m.p.h. at 10,000ft.

Beech D-18. Nearly 600 D-18s have been produced, this well-known 10-seat light transport being still in production 14 years after the first flight of the prototype. Its two engines are P. and W. R-985s, giving a total take-off power of 900 h.p. and a cruising speed of 211 m.p.h. at 10,000ft. Range is 910 miles.

Span, 47ft 7in; length, 33ft 11½in; wing area, 349 sq ft; weight empty, 5,770 lb; gross weight, 8,750 lb.

Bell 47. Widely used in America and elsewhere (of over 300 built, more than 100 are employed on agricultural work), the Bell 47 helicopter was the first to be commercially licensed in the U.S. It is a three-seater powered by a vertically mounted 178 h.p. or 200 h.p. Franklin engine, and has an operating speed of 80 m.p.h. Maximum endurance on 60 per cent power is 2.8 hr.

Cessna 195. Powered by a 300-h.p. Jacobs radial, the 195 is a five-seat high-wing monoplane capable of cruising at 160 m.p.h. for 750 miles. Floats or skis may be fitted.

Grumman Goose. Most famous of the Grumman amphibians, the Goose is a general-utility machine powered by two 400 h.p. Wasp Juniors. It has been succeeded by the larger Mallard.

Span, 49ft; length, 38ft 4in; wing area, 375 sq ft; weight empty, 5,425 lb; gross weight, 8,000 lb; cruising speed at 5,000ft, 191 m.p.h.; range, 640 miles.

Hiller 360. Smallest helicopter in commercial service, and widely used in America, Britain and elsewhere for spraying and other duties, the Hiller 360 is powered by a 178 h.p. Franklin and carries pilot and two passengers. A notable feature is its patent Roto-Matic control system, which provides inherent stability by the use of a small pilot rotor.

Main-rotor diameter, 35ft; length, 28ft 9in; weight empty, 1,432 lb; gross weight 2,400 lb; cruising speed, 76 m.p.h.; range, 210 miles.

Sikorsky S-51. This four-seat helicopter, which went into production in 1946, has accumulated flight experience in the region of 180,000 hours. It is built in England by Westland Aircraft, Ltd., and is available here in two forms—the Mk IA (500 h.p. Alvis Leonides) and the IB (450 h.p. Wasp Junior). The following data apply to the Leonides-powered version.

Main-rotor diameter, 48ft; length, 57ft 8in; weight empty, 4,320 lb; gross weight, 5,700 lb; cruising speed, 85 m.p.h.; endurance, 3 hr.

Sikorsky S-55. Capable of accommodating 10 passengers, the S-55 flew for the first time in November, 1949. Since then well over 100 have been built and military versions have given valuable service in Korea. An outstanding feature of the design is the accessibility afforded by mounting the power-unit, a 600 h.p. P. and W. Wasp, in the fuselage-nose behind clamshell doors. Westland Aircraft, Ltd., have acquired the British production rights and manufacture of the S-55 has already begun at Yeovil.

Main-rotor diameter, 53ft; length, 41ft 8¼in; weight empty, 4,267 lb; gross weight, 7,300 lb; cruising speed on 70 per cent power, 86 m.p.h.; range, 470 miles.

MORE ABOUT A MINIATURE

SOME further information is now available concerning the diminutive experimental helicopter illustrated on page 289 of *Flight* for March 14th last. The project is sponsored by the Ordnance Corps of the U.S. Army, and a prototype, designated XH-26, was completed earlier this year by the American Helicopter Company, Inc., of Manhattan Beach, California.

This unique machine stands only 6ft high and the rotors can be disposed parallel with the cabin so that the entire aircraft can be stowed in a container—measuring 5ft x 5ft x 14ft—carried in a large bomber or transport and dropped by parachute. Two men can then remove the helicopter from the crate, extend the blades and prepare it for flight in only 20 minutes.

Although designed basically as a one-man helicopter for reconnaissance, the XH-26 is said to have sufficient lift and adaptability to be fitted with two external litter carriers and to carry two men side by side or tandem in the cabin, without modification of the airframe.

The two rotor-tip pulsejets each measures 6⅛in in diameter and weighs 16 lb. It is said that they will operate on petrol, paraffin or diesel oil and will give the helicopter a top speed of 80 m.p.h. and duration of 1½ hours.

HOW GOOD IS GOOD?

An Attempt to Assess the Economic Quality of Contemporary Commercial Aircraft

BY THE TECHNICAL EDITOR

IT is said that there is no such thing as bad whisky, but some whiskys are better than others; the aphorism might well be paraphrased to apply to aircraft, particularly commercial aircraft. The appeal of whisky is essentially a function of personal taste, and thus can be expressed as a matter of opinion: the economic efficiency of a commercial aircraft is, however, expressible as a matter of hard fact in which opinion has no place.

Any attempt to assess the economic efficiency of an aircraft is, nevertheless, fraught with a plethora of pitfalls, and the results of any comparative analysis are bound to be questionable on many grounds. Which particular version of which particular aircraft is the one selected for examination? What date is concerned: now, in six months, a year, or two years hence? What equipment schedule is involved? What airline operating standards have been taken as data? These and a host of other variables all affect the individual picture of the individual aircraft.

Thus it is virtually impossible to make a comparative study of a group of competitive aircraft without being invidious in some degree. It should not be inferred from this that we are offering an advance apologia for any of the conclusions we shall draw. We have accorded what we believe to be realistic values to the several parameters involved for each of the ten aircraft selected. With these values as data we have based our calculations on the S.B.A.C. standard method for the estimation of direct operating costs and so have derived a picture of the relative economic efficiency of the various types. The aircraft chosen for comparison represent a fair selection of contemporary types in the sense that they are in service, just starting in service, or are projected for future service. The characteristics of the several aircraft concerned are given in other pages of this issue, as are statements of which aircraft are in use, in delivery or on order for which airlines: we need not, therefore, go over the same ground here.

The payload-range curves state the basic ability of each aircraft to carry given loads over specific distances, the stage lengths quoted throughout being still-air ranges with full standard allowances. These curves, in association with the direct operating cost calculations, enable curves of pence per ton-mile to be plotted for the appropriate stage-lengths, and so define the basic economical measure of each type. However, payload as an expression of weight-carrying ability is of prime importance only in terms of passengers, simply because the fare which can be charged per unit weight of human being is appreciably higher than that which can practicably be charged for freight. For example, the charge for freight London-New York is a little over 8s 6d per lb, whereas the single tourist fare for the same journey at £96 9s works out at just under 10s 9d per lb, taking the tourist plus baggage as weighing 180 lb.

Tourist-class travel has been the subject of a great deal of attention of late, and the general consensus of opinion has it that the future financial well-being of the airlines is substantially vested in their ability to cater for this new, and immeasurably great, revenue potential. Because of this we have plotted cost curves for the various types in terms of pence per tourist seat mile *versus* stage-length. With the task of producing these curves we were at once faced with a perplexing problem, namely how many seats could be fitted in the several aircraft concerned. Finally we arrived at the following orders:

Constellation 1049C	102	DC-6B	82
DC-7	97	Convair 340	58
Martin 4-0-4	52	Ambassador	49
Viscount 701	48	Hermes IV	64
Comet	66	Britannia	107

These accommodation capacities, however, represent the maximum practicable number of seats which can be squeezed into the physical confines of each fuselage, whilst neither incurring an unacceptably low level of comfort nor infringing the safety and loading limitations. In some instances, however, payload/range capacity takes a severe beating; the Convair 340 and Martin 4-0-4, for example, at the aggregate weights of passengers they have room to carry, would have stage-ranges so short that they scarcely appear on the seat-mile graph. In defence of these excellent aircraft, however, it must in all fairness be pointed out that, to our knowledge, tourist versions are not contemplated; we have included these types in the selection chiefly to afford a comparative measure for the Ambassador and Viscount 701. Conversely, the payload capacity of the larger aircraft is well in excess of the weight equivalent of their maximum seating capacity.

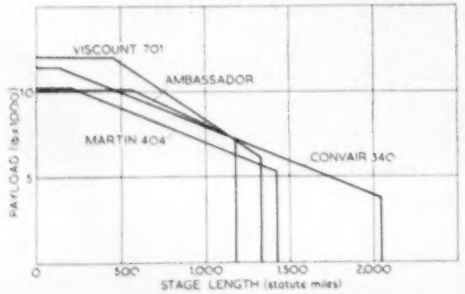
As may be seen from the ton-mile cost curves, the general character is for cost to diminish to a minimum, which is reached at the maximum stage length over which capacity payload can be carried, the cost thereafter rising as payload decreases with extended stage length. The fact that the seat-mile cost curves are calculated on the appropriate fixed number of seats for the individual aircraft means, however, that these curves terminate at the maximum stage-length over which the given number of passengers can in each case be carried. As a corollary, this stage is naturally the optimum for economic efficiency.

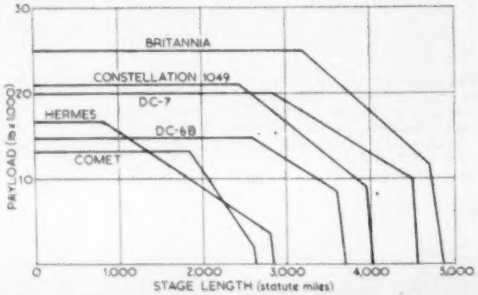
Now let us have a look at how the various types compare. The first thing that insistently demands notice is the overwhelming advantage enjoyed on virtually every count by the Bristol Britannia; this wonderful aircraft will carry a greater payload, in terms of weight or number of passengers, farther than any other of its competitors, will carry them faster, and will do it much, much more cheaply. The almost incredible thing is that, as well as possessing marked economic advantage at the greater stage distances, it is also cheaper to operate at the shortest stages; in fact at 500 miles it is still cheaper to run than its nearest competitor, the DC-7, is at its optimum stage of 3,260 miles. The Britannia is beaten on only one count, block-speed, and then only by the Comet. It has been said that efficiency is economy and by this precept the Britannia looks like being far and away the most efficient commercial aircraft the world has so far known, or for that matter is likely to know for some long time to come.

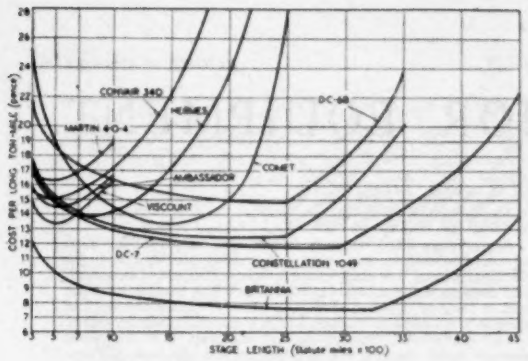
The DC-7 looks like being a very good aeroplane indeed, although it is close-pressed by the Super Constellation 1049. The latter has the advantage of being already in service, and thus will reap the benefit of the "hidden talents" such as servicing and maintenance experience, and airline operating experience, which do not show up in the direct costs.

As already pointed out, the Convair 340 and the Martin 4-0-4 have no tourist application so far as is known at present, and thus it is not really fair to bring them in on the

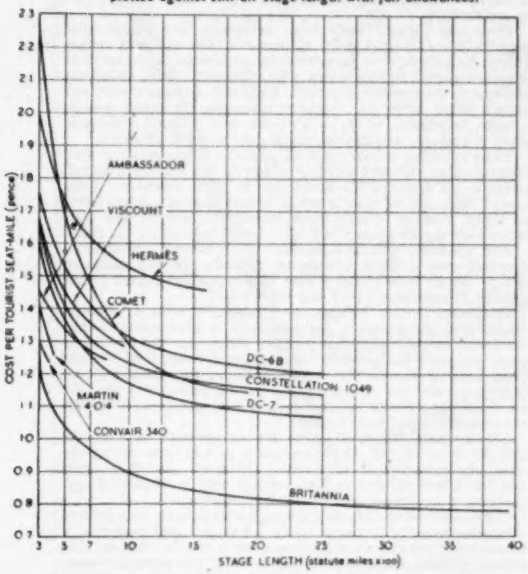
Curves of payload/stage-length performance for (left) the shorter range and (right) the longer range types.

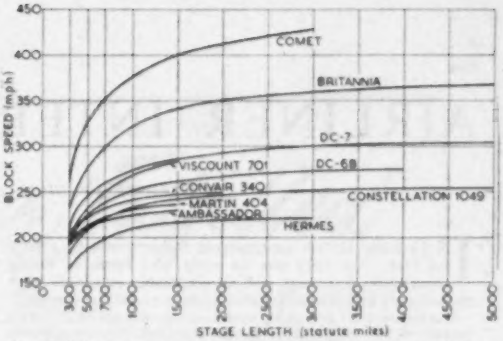






(Below) Performance curves in terms of pence per tourist seat-mile plotted against still-air stage-length with full allowances.





(Above) Performance curves of block-speed plotted against still-air stage-length with full allowances.

(Left) Performance curves in terms of pence per long ton-mile plotted against still-air stage-length with full allowances.

graph of tourist seat-mile costs. By the same token neither the Ambassador nor the Viscount 701 are dimensionally well fitted to cater for tourist traffic. Even so, and despite the limitations of their cabin capacities, both these British aircraft show up well over the shorter stages; somewhat surprisingly in view of their respective external appearances, the Ambassador has something of an edge over the Viscount on a seat-mile basis despite the not inconsiderable advantage the latter enjoys on a ton-mile datum. On the ton-mile calculation the Ambassador shows marked superiority over the Martin 4-0-4 and Convair 340 in the 300/1,000-mile stage-range, with the Viscount clearly cheapest of the four and showing its optimum at 500 miles. Again, although its fuselage seating capacity is against it for tourist application, on the pence per ton-mile basis the Hermes IV shows advantage over the Martin 4-0-4 at stage lengths which exceed 400 miles, over the Ambassador at stage-lengths in excess of 450 miles, over the Convair 340 at stage-lengths exceeding 475 miles, and over the Viscount at stage-lengths superior to 675 miles.

The DC-6B shows up in the calculations much as one would expect of an aircraft which, essentially, is a "stretched" version of a much earlier design. It is a sound aeroplane which offers the operator a useful measure of comparatively low-cost operation, and although it does not show to great advantage on a ton-mile assessment, it has a valuable range with an optimum stage of 2,500 miles. On a tourist seat-mile basis, its relatively capacious fuselage gives it a better value, although it does not compare very well with the Viscount and Ambassador over their stage capacities.

Finally, the Comet. We have taken the Series 1A version for our analysis, and although the increased tankage of this aircraft over the Series 1 now operated by B.O.A.C. alleviates the position somewhat, the enormous fuel consumption of the four Ghost turbojets militate against the economic advantage of a highly refined aerodynamic design. With the exception of the Viscount, the Comet has, too, the lowest payload of the four-engined aircraft included in this survey, yet such is the measure of what high aerodynamic quality means, the Comet is cheaper to operate on a pence per ton-mile assessment than the DC-6B at stages of over 550 miles, than the 4-0-4 at stages of over 675 miles, than the Ambassador at stages exceeding 825 miles, than the Convair 340 at stages exceeding 775 miles, than the Viscount at stages exceeding 812 miles, and than the Hermes IV at stages exceeding 1,050 miles. On a pence per tourist seat-mile basis, it overtakes the DC-6B at 910 miles, and the Super Constellation at 1,375 miles. We may justifiably look forward with confidence to the performance of the Series 2 Comet with Avon engines, and even further, to the Series 3 which, also with Avons, will feature a considerably enlarged fuselage.

TABLE 1: TOTAL COST PER AIRCRAFT FLYING HOUR (£)

Stage-Length (statute miles)	Constln. 1049	DC-6B	DC-7	Convair 340	Martin 4-0-4	Ambas-sador	Viscount 701	Hermes IV	Comet 1A	Bristol 175
300	127.46	116.02	134.17	63.61	59.46	56.88	66.85	88.33	161.32	131.52
500	124.63	115.07	131.84	61.80	57.87	56.59	66.82	86.08	145.34	129.46
700	122.02	114.81	130.34	60.95	57.17	56.33	66.70	85.08	140.06	128.96
1,000	121.97	112.16	129.22	60.26	56.53	55.58	66.61	84.12	133.18	128.26
1,500	120.89	111.33	128.20	59.72	56.08	54.87	66.49	83.80	128.79	127.20
2,000	120.33	110.89	127.70	59.42	—	—	—	83.42	123.65	126.62
2,500	120.05	110.58	127.32	—	—	—	—	82.72	121.36	126.37
3,000	119.78	110.26	127.05	—	—	—	—	82.54	119.86	126.24
3,500	119.61	110.20	126.87	—	—	—	—	—	—	126.03
4,000	119.55	110.12	126.92	—	—	—	—	—	—	125.99
4,500	119.39	—	126.80	—	—	—	—	—	—	125.91
5,000	119.31	—	126.79	—	—	—	—	—	—	125.80

The above are aggregate totals of the variable costs, annual costs and fixed hourly costs.

(Below) These costs are derived by dividing the individual totals in Table I by the block-speeds.

TABLE 2: TOTAL COST PER AIRCRAFT MILE (PENCE)

Stage-Length (statute miles)	Constln. 1049	DC-6B	DC-7	Convair 340	Martin 4-0-4	Ambas-sador	Viscount 701	Hermes IV	Comet 1A	Bristol 175
300	168.1	143.8	155.6	75.0	72.8	71.4	80.2	127.7	148.4	135.3
500	144.0	124.3	131.8	66.8	65.6	64.2	71.7	110.6	111.0	112.6
700	133.2	116.3	121.7	63.3	62.0	62.2	64.9	103.2	97.4	102.8
1,000	126.4	107.7	113.6	60.5	59.0	59.4	61.2	97.8	85.2	95.7
1,500	120.1	102.3	107.7	58.2	56.8	57.2	58.4	94.0	77.6	89.8
2,000	117.4	100.0	105.0	57.3	—	—	—	92.0	73.0	87.2
2,500	115.7	98.4	103.4	—	—	—	—	90.2	69.2	85.5
3,000	114.5	97.3	102.0	—	—	—	—	89.4	67.0	84.4
3,500	113.7	96.6	101.2	—	—	—	—	—	—	83.3
4,000	112.9	96.2	101.0	—	—	—	—	—	—	82.8
4,500	112.6	—	99.8	—	—	—	—	—	—	82.4
5,000	—	—	99.7	—	—	—	—	—	—	82.2

AIRLINER INTERIOR EQUIPMENT

Present Practice and Future Trends

IN 1946 the British air-transport industry was in a state of flux. Not only was the scale, and form, of future operations uncertain, but no acceptable standards were immediately available to which equipment could be designed.

During the next two years, operations carried out largely with aircraft of basically military design provided experience which was gradually assessed and incorporated in the design of the new British transports. In particular, the Hermes IV may be named as having been the first modern airliner incorporating all the most advanced features of British practice at the time of its design; while the latest ideas are illustrated by the Comet, Elizabethan and Pionair.

Of the overall picture today, we may remark that the airline industry is again in a state of flux. It has realized that air transport can attract a much higher proportion of the travelling public by cutting all "frills"—free meals, beauty kits, and the like—and offering consequently reduced fares. This change of outlook is reflected in the manner in which passenger transports are being furnished.

No longer do we see large aircraft fitted to carry fewer than 20 passengers and provided with sleeping berths; reclining chairs are now universally used even on the largest aircraft, fitted five, or sometimes six, abreast. Crew complements have been cut by increased use of automatic equipment and ground aids. Galleys are smaller, but can serve more meals faster, and toilets take up less floor-space and can therefore be duplicated. High density, in fact, is the keynote in passenger-transport interiors.

Convertibility. There is considerable justification for describing the principle of built-in convertibility—for different transport rôles—as the most important feature of commercial aircraft design to have become established in recent years. Quite apart from the question of building airliners with an eye on their possible emergency service as military transports, the value of an aircraft is clearly greatly increased if the machine can readily be adapted for use in a number of different rôles. With the first cost of the larger transports becoming stabilized at approximately £500,000—exclusive of spares—it would appear that civil operators are everywhere going to demand provision for increased adaptability in the basic design of such aircraft to permit greater flexibility in operation.

Perhaps surprisingly, this feature has nowhere been developed to such a high degree as in this country. It is epitomized in the Bristol 175—clearly destined, unless something quite unforeseen happens, to be a world-beater. In this aircraft the basic fuselage-structure has been designed to permit the installation of standard seats in rows of four, five or six, facing fore or aft, with any desired pitch-spacing. The floor is also stressed for heavy cargo loads, in which case the chair pick-up points function as freight lashing points. Finally, movable bulkheads are fitted to permit any combination of passengers and freight to be carried with the greatest convenience—a system pioneered on the same company's 170 Freighter. All other modern British airliners make provision for variable-density seating, or for combined passenger/freight conversion. Such conversion usually requires some six to twelve man-hours. Present practice is to carry "surplus" seats in the aircraft rather than to off-load them at foreign calling-points; operators do not appear happy about the idea of maintaining stocks of seats at numerous points on their route networks.

Seats. In spite of a new and stringent A.R.B. ruling—9g with a normal 1.2 factor—seats are lighter and more comfortable today than ever before. Almost universally employed is a light tubular frame, often of magnesium, with foam-rubber cushioning; two grades of rubber are usual, the foam being denser for the seat than for the back. Seat facing of wool rep or tapestry is usual, although B.E.A. seats are faced in leather, and some American seats are covered with nylon.

Arms are usually faced with P.V.C. or leather; in some tourist seat-blocks folding arms are fitted, although a strong fixed arm is helpful in supporting the seat-back, a factor of vital importance if rearward-facing is adopted. As for this last vexed question, it may only be said that, pending the results of research now in progress, no airline is prepared to take a decision on "aft-facing" at this time; but new chairs for both British Corporations are designed for fitting to face either fore or aft, as required.

Ashtrays are fitted variously in seat arms or backs; the most advanced ashtray we have seen is that developed by B.E.A. for the Elizabethan; it is easily cleaned, light, extinguishes cigarettes, and displays much thought in its design: it is fitted behind the seat in front of the user. B.O.A.C. ashtrays are usually fitted in the seat-arms, and a new design is in preparation to cater for cigars.

Lap safety-belts, rated at 9g, are universal, as is life-jacket stowage under the seat and a pocket in the seat-back. "First-class" services normally provide a table—usually attached to the seat-arms, although the Elizabethan boasts tables which can be attached to the reclining back of the seat in front; the table pivots to remain level.

Furnishing fabrics. Both from decorative and maintenance aspects, P.V.C.-coated cloth is preferred for wall and ceiling lining; backed, but not supported, by glass-wool insulation, it is usually attached to thin wood, plastic or metal laths, which are screwed to the fuselage structure. Bulkheads, vestibule walls and certain other areas are frequently panelled in wood veneer, usually laminated, which is surfaced with a hard, synthetic-resin to preserve a polish and render the material fireproof.

Floor covering usually takes the form of a 100 per cent wool carpet, either rubber-backed or mounted on felt; in England, nylon is not favoured for floors, due to its tendency to "matt-down" and also to melt away if locally heated. Areas liable to heavy wear or to spilt fluids—vestibules, galleys, and crew space—are chiefly floored in P.V.C. fabric upwards of ⅛in thick.

For window covering—essential on passenger transports—fireproof wool or linen curtains are normally provided, although B.E.A favour blinds: the Viking uses accordion-pleated blinds and the Elizabethans a very neat roller blind.

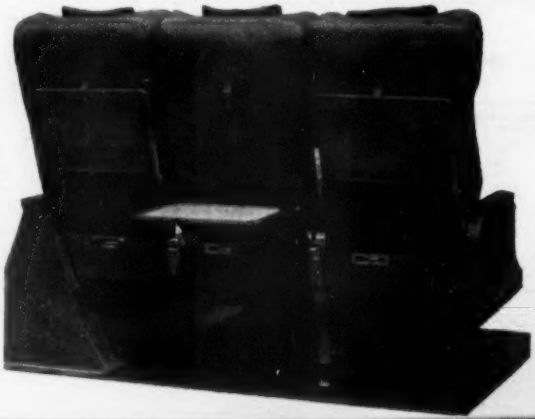
Windows. Double Perspex-sheet windows, with a silica-gel dessicant in the air-space, are standard; on pressurized aircraft the inner window takes the pressure difference, the thin outer pane accepting the possibly high temperature-gradient without great internal stress. The A.R.B. specifies that there shall be (approximately) one emergency exit per six passengers; windows are the obvious choice for such exits and, on pressurized aircraft, are arranged to pull away inwards.

Theoretically, the ideal shape for an aperture in a hollow cylinder is an ellipse. It is interesting to note that two of the most important British pressurized transports—the Bristol 175 and the Viscount—do, in fact, employ such a window shape, contrary to the influence of the fuselage structure.

Cabin-atmosphere. Much attention has necessarily been paid to cabin-conditioning in recent years. The essential elements of pressurizing systems are well known, but it may be recorded that present practice favours admission of air to the passenger-space at floor level, with extraction from a higher level. Additional individual air inlets are almost universal: on non-pressurized aircraft these are supplied with ram air from external intakes; such fittings are adjustable both in direction and in volume flow. Individual fans, such as are seen on B.O.A.C. tourist Constellations, are unusual and may not be repeated on future aircraft.

Humidifying equipment is essential for high-altitude aircraft; but possibly the greatest single conditioning problem is to provide an efficient, light refrigeration installation which, like the heating equipment, must be capable of functioning while the aircraft is at rest on the ground.

An oxygen installation is always provided to serve all members of the flight crew—even on pressurized aircraft—while portable



From the rear, the Elizabethan triple seat displays the fitted tables—which do not prevent the seats from reclining—and the ashtray and cup-holder installations.

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AIRLINER INTERIOR EQUIPMENT . . .

oxygen-sets are necessary items carried for therapeutic use and made available to individual passengers if the occasion so demands.

Lighting. Although some countries seem to have decided in favour of strip (fluorescent-tube) lighting, filament lighting is preferred in British airliners, both from the point of view of serviceability and weight; no high-voltage demand is made by such bulbs and first cost is low. Cut-and-dried statements cannot be made about direct or indirect lighting, this being a choice influenced by the cabin layout. Individual lights are now always placed on the cabin wall (although some chairs, carrying such lights, are still in use), although annoyance may be caused to other passengers if they are incorrectly focused. B.O.A.C. have found a way to move such lights (and other individual amenities) to cater for variable-pitch seating, and this design feature has been employed on the Bristol 175.

The Pantry. Replacing the old galley, the modern airliner pantry is a most highly developed installation. Fabricated from standard sections, various sizes of pantry can be installed to meet demands. By serving main meals on the ground, the pantry may be almost eliminated, yet the gain in payload may be more than offset by the increased transit time. The whole problem is enormously accentuated by the introduction both of very fast aircraft (e.g. the Comets) and of tourist services.

In any case, no cooking is now performed on board. The standard service, at present, can be divided into two types. The full meal service requires the re-heating of frosted pre-cooked meals, which are then served on a tray as a complete unit. A plastic tray is usually used, with fitted plates, containers and cups; plastic or silver cutlery is provided, the whole being washed on the ground and stored on board ready for use. The second type of meal—offered on tourist services—rarely includes cooked food and is served in a container as a snack meal, using expendable paper equipment.

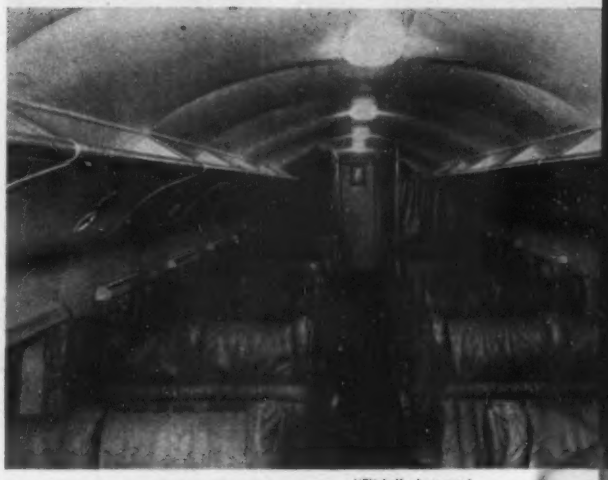
The location of the pantry appears still to be a matter of individual choice; if anything, it is preferable to have it forward, between the passenger cabins and the crew. If large numbers of meals are to be served on a comparatively short flight it is advantageous to have a pantry large enough to permit two stewards to work together without interference.

Biggest item of pantry equipment is the oven (often absent on tourist aircraft). The new ovens installed in B.O.A.C. aircraft can heat 12 frozen meals in 12 minutes, or 36 in 50 minutes, allowing for 14 minutes' warming up. Electrically heated, this unit weighs 56 lb, or 62 lb less than the best previous equipment. A cold box will also be provided to store frozen food and, at a higher temperature, fresh food; in the Bristol 175 the CO_2 sublimation rate is thermostatically controlled. Further items of removable equipment will be urns—about 3 gallons with a 3 kW heater element—and hot-cups holding about a quart, for "odd" cups of coffee. A stainless-steel sink and a large waste receptacle (of waterproofed fabric) are also necessary. On short-range aircraft, of course, less elaborate equipment is needed.

If a bar is carried, this is usually a removable unit, lockable and provided with Customs seals. Downstairs lounges *à la* Boeing 377 will probably remain unique for a considerable period. The best way of regarding the whole subject of aircraft pantries is to realize that the operator has a range of meal services and a range of seats and that he can play a tune on these to his heart's content. But he cannot adopt tourist seating without sacrificing something, just as he cannot provide superb meal service without sacrificing something else—in which connection it may be appropriate to remark that the B.E.A. "Silver Wing" service to Paris employs three stewards and flies at a reduced air speed. B.E.A., incidentally, have a completely new pantry under development, which will be described in a subsequent article.

Miscellaneous equipment. On long-range aircraft one usually finds a library—which should house papers and magazines from all countries served by the aircraft, as well as compact reading-matter of more permanent nature (Penguin books in British aircraft)—while ice-water fountains, with paper cups, are popular with American passengers in particular.

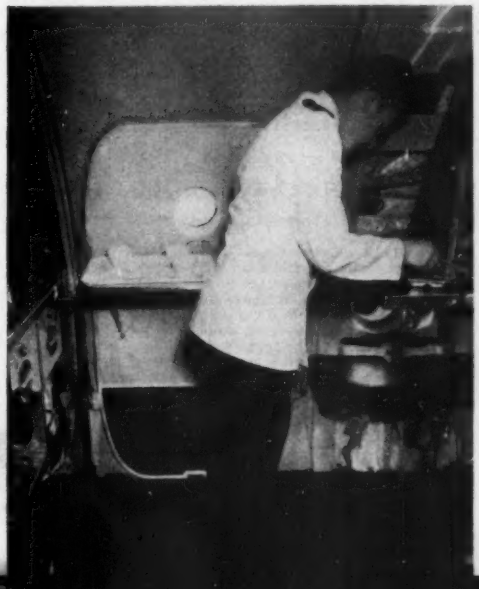
Cloakrooms are required near the main passenger entrance, fitted with double coat hangers and enclosed by curtains; steward

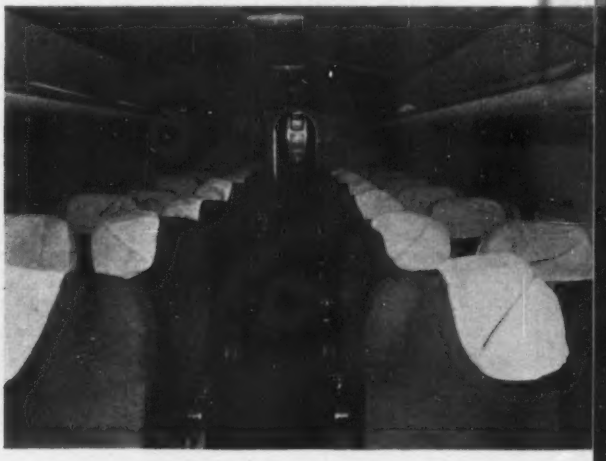


"Flight" photograph

The Pionair DC-3 interior shows that, for short stage-lengths, much denser seating than has hitherto been attempted is quite acceptable. Each double seat weighs less than did the original single unit, while improving both comfort and allowable accelleration loading.

The standard of comfort for which the Hermes has become renowned is continued by its fast companion in B.O.A.C. service: the Comet interior (right) shows well the unusually shallow slope of the baggage racks, beneath which the individual reading lights and steward call-buttons are mounted. The pantry of the Comet (left) is typical in illustrating the space available to stewards, notwithstanding the compactness of the complete installation.





Affording an interesting comparison with British practice, this typical DC-6 interior shows liberal use of P.V.C. and of wood panelling. Indirect lighting is fitted on this particular aircraft.

AIRLINER INTERIOR EQUIPMENT . . .

call-buttons will be provided for each passenger, lighting both at the stewards' station and (ideally) at the button.

Toilets typically employ flushing chemical closets, serviced upon the ground; wash-basins (supplied with water heated by immersion elements) are preferably sited in an adjacent, but separate, room; men's rooms often have racks for toilet accessories and are fitted with 24-volt D.C. and 110- and 240-volt A.C./D.C. sockets for razors. Ladies' powder-rooms have been accorded much attention and, on large aircraft, provide all basic beauty preparations in permanent fittings.

A point not previously mentioned is the increasing tendency, particularly with pressurized aircraft, to make access to controls, pipes and wiring available from the interior of the aircraft only. While this helps the airframe designer in eliminating what would otherwise be numerous pressure leaks, it can seriously affect the appearance of the interior furnishing, particularly after a succession of operations has been carried out.

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Galley Equipment.—General Electric Co., Ltd.; Vickers-Armstrongs, Ltd.

Tableware.—B. Attewell and Sons, Ltd.; Warerite, Ltd.

Toilet Equipment.—Elsan Manufacturing Co.; Teddington Controls, Ltd.; Vickers-Armstrongs, Ltd.; Charles Winn and Co., Ltd.

Water Supply.—E.C.D., Ltd.; the Permutit Co., Ltd.; Charles Winn and Co., Ltd.

Lashing Equipment.—Aerolex, Ltd.

Detail Fittings.—Midland Aeroquipment, Ltd.; Willowbrook, Ltd.

AN OFFICIAL STATEMENT

A GOVERNMENT statement on the question of rearward-facing seats in civil aircraft was made in the House of Lords recently by the Earl of Selkirk. Lord Ogmore, the former Minister of Civil Aviation, had asked what progress was being achieved in this regard.

Referring to the national and international consideration which had been given to the problem, Lord Selkirk pointed out that safety in a crash depended on the ability of the seat and its attachments to withstand the decelerative forces applied. The Government believed that seats strengthened to withstand these forces should face to the rear in cases where, in order to make the maximum use of the available space, they were placed close together. This would avoid the hazards to passengers that arose from the tendency to jerk forward against their belts. Any such strengthening of the seats and their attachments involved an addition to the weight of the aircraft and the safety considerations had to be balanced against the economic penalties.

A series of design-studies had therefore been ordered by the Ministry of Supply to ascertain what weight penalties and engineering problems would be involved in installing backward-facing seats designed to withstand decelerative forces of 12g, 15g and 25g in the Pionair, Comet, Bristol 175 and Viscount. Two of these studies had just been received. As the others were provided they would be carefully examined, and it was hoped that they would establish the possibility of adopting rearward-facing seats, at any rate in high-density layouts, without imposing undue economic penalties.

Lord Ogmore commented that recently Australia had adopted this policy, as also had the R.A.F. But he was not at all sure whether the M.o.S. were not letting the best be the enemy of the good—in other words, whether it was necessary to cater for very intensive forces when it was possible to cater quite easily for medium forces. He further asked if it was not possible to have this kind of seating in the new jet and turboprop aircraft. He appreciated that difficulties arose with existing aeroplanes, but could not the new types go into production with this kind of seating?

Lord Selkirk, replying, recalled that he had said earlier that economic factors were being balanced against safety. With regard to new types, that again was a question of utilizing the seats which had been made. He wanted to emphasize that this was not the only consideration that the Government had in mind—the major consideration was that there should be no accidents at all. It was a matter for some pride that during the whole of last year there was no fatal accident in either of the Corporations, or in any of their associated services.

INTRODUCTION TO THE JET AGE

RONALD WALKER, air correspondent of the *News Chronicle*, we know as a lively-minded journalist and a genial companion on many an excursion. We have never imagined him, however, as a reporter on the staff of the *Wagga Wagga Advertiser* which, according to a biographical note in his newly-published booklet, *The Jet Age*, he indeed was. Interesting as this fact is, it is of less moment than the work itself, which sets out, with admirable lucidity, the background of British civil aviation, the fundamental reasoning behind the Comet, and the essential facts concerning the Britannia, Viscount and other British contenders for world airline supremacy.

This solid, if slender, little book—No. 8 in the *Background to the News* series—is obtainable from the *News Chronicle* for 1s 6d, and is commended to all who seek an introduction to the Jet Age.

HISTORY OF THE R.O.C.

"Forewarned is Forearmed—The Authorized History of the Royal Observer Corps," by T. E. Winslow. Published in 1948 by William Hodge. Now obtainable from W. Heffer and Sons, Ltd., Petty Cury, Cambridge. Illustrated. Price 5s 8d, including postage.

MANY new members of the Royal Observer Corps may not have seen this official history which was published in 1948. Despite its limitations, it is the best and most complete record of the development and achievements of the Corps from its humble beginnings in the 1914-18 war until its temporary stand-down in May, 1945. It is a story of which old members can be proud, and which might well persuade new readers to join the reconstituted and still vitally needed R.O.C.

All remaining copies (the original price of which was 12s 6d) have been acquired by Heffer's of Cambridge.

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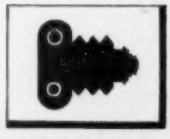

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Commercial Aviation Commentary

By HENRY MORRIS

AT this time, when the toughest problem facing most operators outside the U.S.A. is the procurement of new aircraft—this applies more especially to the British independent operators—much envy of K.L.M. has been raised by the recently announced World Bank loan of $7 million. This loan is designed to provide about 20 per cent of the funds required for some $33 million worth of new American equipment, including Lockheed Super-Constellations, DC-6Bs and Convair 340s. There are several interesting features of this loan which operators all over the world are studying—from reasons of envy in the case of the new equipment "have-nots," and from reasons of competitive dismay in the case of the "haves" who hoped that K.L.M. might remain in the "have-not" camp for some long time. And the S.B.A.C. cannot be overjoyed at the International Bank for Reconstruction and Development giving such a fillip to the U.S.A. aircraft industry. K.L.M. were surely top-line potential customers for Comets and Britannias.

The first point of interest is that the loan is fully guaranteed by the Dutch Government. K.L.M. is very nearly 100 per cent Government-controlled, so this is not surprising; but it is the first indication that with a Government guarantee the World Bank looks upon aircraft procurement as contributing to World Development and also, naturally, a reasonably safe bet. The implication for British operators is that, given Government guarantees, they might obtain a similar loan from the World Bank.

The second notable point is that a private bank, the Chase National, is participating directly in the loan by advancing up to $3.5 million of it. This again will lead to much hard thinking by the British independent operators. They might get U.S. banks interested in the advances to British companies with the combined backing of the World Bank and a U.K. Government guarantee. After all, the U.S. banks have advanced the greater part of the finance with which U.S. air transport has built itself into such a world-dominating position. As they stand at the moment no British independent operator would be likely to get a brass farthing (or copper dime) from any bank, but once they held secure licences for commercially promising scheduled and semi-scheduled operations the position might be very different.

Point three is that K.L.M. will have 6½ years to repay the loan at an interest rate of only 4½ per cent. Admittedly this is much more than B.O.A.C. has to pay the British Government for its advances, but is substantially less than many U.S. operators have to pay to their own financiers.

AT the moment, however, this momentous development can hardly lead to anything more substantial than wishful thinking. The loan represents only one-fifth of the total purchase-price of the new equipment and it is not likely that the World Bank would be prepared to put up 100 per cent of the cost of any re-fleeting programme; and it is even less likely that the U.K. Government would lay out any dollars for aircraft purchases at this stage. Also, K.L.M. have already shown themselves to be reliable borrowers, as they repaid in full an Export-Import Bank credit of approximately $3 million granted in 1947.

But there is an important lesson to be learnt from this transaction by both the U.K. operators and the U.K. Government. It is that hard cash is in fact forthcoming for aircraft purchases even at the present astronomic price of modern equipment—*provided* that there is some degree of Government guarantee to support the transaction. The second part of the lesson is that the British Government *must* intervene in this problem of aircraft procurement if the British industry is to make up leeway. The third part is that the air-transport industry of any country must be able to secure the best equipment available and not be restricted to the products of its own aircraft-manufacturing industry.

THE S.B.A.C. may cavil at part three but the facts speak for themselves. If the British effort is to catch up on the U.S. effort—it is too far behind to talk about holding its own—it cannot afford to wait for the new British types, the advent of which may be almost indefinitely deferred due to obstacles entirely outside the control of the S.B.A.C. The U.K. is already far behind in the development of large-scale air-freighting and it is futile to talk of expanding this side with completely out of date aircraft such as Yorks and Tudors—or even with Argonauts and Hermes. Nothing less than the counterpart to the DC-6A or the Super-Constellation—or those aircraft themselves—will put the British operators fairly and squarely in the international air-freighting picture.

So the British air transport industry will await with more than casual interest some concrete plan for aircraft procurement in the Government's promised new policy—and will want to know what Government support there may be for any approach to the World Bank.

And, overshadowing the purely air-transport aspect of this K.L.M. deal is the economic fact which has been stressed in U.S. comment upon it. This is that the credit not only facilitates the purchase of American equipment but also gives the Dutch the means of earning valuable foreign exchange thus strengthening their economy. If the British aircraft constructors somewhat naturally shrink at the thought of British operators securing dollars for more U.S. equipment, then an impartial assessment of the overall effect on our currency—as well as on our air-transport position—might show that it would be better to sell all new British transports (if they are as good as is hoped) to dollar-area countries, and spend some of the dollars so earned as part contribution towards U.S. equipment with which to earn still more hard currency. An involved assessment certainly, and one full of ifs and buts, but the buts may be insignificant buts if the ifs can be made to materialize!

FORTHCOMING EVENTS

May 17. Wolverhampton Aero Club: Goodyear Trophy Race and Display.
May 18. Northamptonshire Aero Club: At Home, Sywell.
May 21. Aircraft Recognition Society: Rose Bowl Contest, London.
May 22. Aéro-Club du Dauphiné: Air Meeting, Grenoble.
May 23. Aircraft Golfing Society: Annual Dinner.
May 25. Aéro-Club de France: Coupe Stomm (helicopters).
May 25. Aero-Club de Pisa: Rally.
May 25. Aero-Club de France: Foire de Paris Rally.
May 25. Ragosine-Auster Trophy Navigation Competition, Rearsby.
May 29. R.Ae.S.: Fortieth Wilbur Wright Memorial Lecture: "Prophecy and Achievement in Aeronautics," by Sir Harry M. Garner, C.B., M.A., F.R.Ae.S.
May 30-June 2. Model-flying team contest, Belgium v. Great Britain, Namur.
May 31-June 2. Aero-Club de Cannes: International Rally.
May 31-June 2. Ailes Sparnaciennes: Champagne Rally.
June 2. S.S.A.F.A.: Air Display, Yeadon, Leeds.
June 2. Midland Aero Club: Display, Elmdon.
June 4-14. Third Mechanical Handling Exhibition, Olympia, London.
June 6-8. Aéro Club d'Italie: Air Circuit of Sicily.
June 7-8. Yorkshire Aeroplane Club: International Invitation Rally, Sherburn-in-Elmet.
June 8. Royal Naval Flying Club: At Home, R.N. Air Station, Gosport.
June 8. R.A.F. Golfing Society: Match v. Air Ministry G.S.
June 14. Girl Guides Association: Air Ranger Flying Pageant, Sywell, Northampton.
June 14. Auster Flying Club: Rally, Rearsby.
June 14. R.A.F.A.: Air Pageant, Sydenham, Belfast.
June 14. London Aeroplane Club, Vintage Aeroplane Club and Herts Auto and Aero Club: At Home, Panshanger.
June 14-15. Aéro-Club de Charente Maritime: Pons Rally.
June 15. R.Ae.S. Garden Party, White Waltham.
June 18. Aircraft Recognition Society: Contest, London.
June 21-22. Aéro-Club de Basse Normandie: Flers Rally.
June 22. Aéro-Club de Savoie: Aix-le-Bains Rally.
June 24. Golf: R.N. v. R.A.F., Sandwich.
June 25. Golf: R.A.F. v. Army, Sandwich.
June 27. London Aeroplane Club: Midsummer Dance, Hatfield.

CIVIL AVIATION

THE FUEL CUTS

WORLD-WIDE dependence on the United States for the supply of aviation spirit has been forcibly underlined by the general fuel shortage resulting from the strike involving 90,000 American oil workers. In this country, the first official action taken to counteract the shortage was the Control of Aviation Spirit Order, which came into effect on Monday, May 12th. The Order—anticipated by the cancellation of several B.E.A. services—provides that operators should not acquire, during the 28 days beginning on May 12th, more than 65 per cent of the amount of aviation spirit (in excess of 80 octane) obtained during April (a 30-day period). In practice, therefore, the reduction will be 30 per cent of recent deliveries. A comparable restriction has already been applied in America, and all countries have been urged to take similar steps. It was expected that fuel supplies would be reduced on a world-wide basis, and that airlines would not be able to avoid the problem by altering their refuelling points. Announcing the Order, the Ministry of Fuel and Power pointed out, "to remove any misapprehension," that all fuel stocks in this country were owned by the oil companies.

The fuel crisis comes at an unfortunate time—soon after the beginning of the summer season, with its consequent increase in traffic. The 30 per cent cut is based on fuel requirements in a less active month, and may thus have a greater proportionate effect on services. Flying on reserves, most companies operated normal schedules for the few days immediately following the announcement. B.E.A., however, were particularly anxious to have sufficient fuel on hand to cope with the Whitsun rush, and cancelled a number of services even before May 12th. Frequencies were reduced on most B.E.A. routes, including those from London to Paris (four of the 14 daily services have been cancelled, including three of the four off-peak flights), Amsterdam, Brussels, Hamburg and Düsseldorf; among the other routes affected are Manchester-Zürich, Manchester-Amsterdam-Düsseldorf, Manchester-Glasgow, Belfast-Birmingham and London-Orkney. Freight services from London to Copenhagen, Stockholm, Paris and Brussels have also been cancelled, but the London-Milan freight-services are unaffected, being flown by kerosine-burning Dart-Dakotas. Temporary use of a similarly powered Viscount prototype on the London-Paris route has been suggested as an interim means of increasing services without using extra petrol.

Possible cuts in B.O.A.C.'s services were being discussed at the time of going to press, and the majority of the other transatlantic carriers had not announced any cancellations. The opening of "cut-fare" services on the transatlantic route has added to the already high degree of competition between operators, and there may well be a tendency to reduce services in other directions. The B.O.A.C. Comet flights to Johannesburg will not, of course, be affected. The independent airlines have not yet announced the extent to which associate services will be affected—although the effect on tours and other seasonal traffic may be severe; in any event, priority is likely to be given to the overseas trooping flights by the companies concerned.

Severe restrictions have been imposed on all military flying by the U.S.A.F., excluding operations in Korea. R.A.F. operational flights in the Far East, transport flights and "individual training" will continue as usual, but squadron training (other than with jets) and communication flights will be reduced.

GERMAN TRAFFIC-CONTROLLERS under instruction at Munich, where the Civil Aviation Division of the American High Commission is training 85 of these students to take over airfields in the American Zone. Perfect English is a requirement for the course, which attracted 2,000 applicants, most of them ex-Luftwaffe men.

RESTRICTIONS ON AIR TRAVEL

INDICATIONS of a falling-off in airline business were referred to last week-end by Sir Miles Thomas, chairman of B.O.A.C. Speaking at the Conference of the Advertising Association, he said: "As I travel around the world, I have begun, in the last two or three months, to sense that there is a suggestion of recession in the air. The sellers' honeymoon is going to end. It is not going to be long before there are some pretty tough propositions facing everybody in the commercial field."

Writing in the *B.E.A. Magazine* for April, Mr. Peter Masefield, chief executive, states that on the basis of Easter results, the £25 foreign-currency restriction seems to affect B.E.A. traffic "quite seriously." London-Jersey traffic at Easter had increased by no less than 72 per cent, but the Corporation had carried 3 per cent fewer passengers to Paris this Easter than in Easter, 1951. In all, he states, international passenger-carryings were up by 7 per cent, whereas the domestic increase was 37 per cent; usually it was the other way around.

SYCAMORE ON TOUR

PILOTED by C. T. D. Hosegood, a Bristol 171 Sycamore helicopter left Filton on Sunday, May 11th for a 1,400-mile sales tour of the Low Countries and Scandinavia, arriving at Brussels that evening after clearing customs at Lympne. The itinerary of the tour, which includes visits to the Hague, Hamburg, Copenhagen, Oslo and Stockholm, was outlined in these pages last week.

AER LINGUS LAST YEAR

DURING their financial year which ended recently, Aer Lingus carried 273,055 passengers—22 per cent more than in 1950-51. The company's freight traffic went up by 33 per cent to a total of 3,760 tons. Profit for the year is expected to show an improvement on the previous year's figure of £15,000. The totals of passengers carried on the busiest Aer Lingus routes were as follows (increases in parentheses): Dublin-London, 125,364 (18 per cent); Dublin-Liverpool, 32,191 (28 per cent); Dublin-Glasgow, 30,485 (19 per cent). On the less frequent Dublin-Jersey service, the increase was 98 per cent.

ELIZABETHANS AT WORK

DURING the first three weeks of April, the B.E.A. Elizabethan Flight logged some 1,046,000 passenger-miles on scheduled services and carried 3,430 passengers. At present the "aircraft type cost" of the 47-seat Elizabethan on the 230-mile London-Paris route is given by B.E.A. as 1.76d, compared with 2.05d for the 27-seat Viking, 1.65d for the Pionair (32 seats) and 1.63d for the 38-seat Viking; the present figure will, however, be reduced by an increase in the overhaul-life of the Elizabethan's Centaurus power-plants and the expected improvement in their cooling-drag. The figures quoted, incidentally, reflect only the costs directly associated with the separate types of aircraft mentioned.

S.A. AIRWAYS AND AIRPORTS

DURING 1951, South African Airways carried 15,689 passengers, compared with 12,789 in 1950. The Union's Minister of Transport stated in his recent Budget speech, however, that S.A.A. were expected to show a loss despite the increased revenue. Internal fares would have to be reviewed in the light of increased operating costs. Sums allotted for new equipment for S.A.A. included £440,000 for aircraft, £50,000 for workshop machinery and supplies and £13,800 for Link equipment. The Minister also stated that construction work was proceeding well at the three major airports—Jan Smuts (Johannesburg), Lamontville (Durban), and Bellville (Cape Town). He said that the question of whether airports should be transferred to the central government had recently been investigated by a committee, whose report was now being studied.

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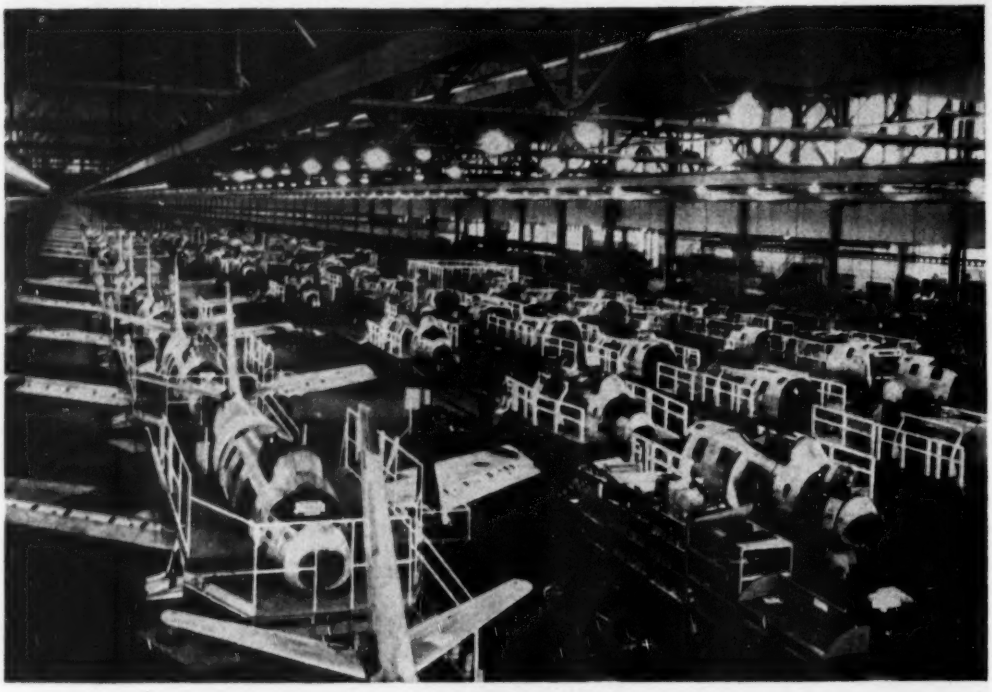

WHAT MAKES CANADAIR A Major AIRCRAFT MANUFACTURER?

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For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.

Vignettes of
CANADA—AIR LAND
At Valcartier Camp near the City of Quebec, Col. Sam Hughes, Minister of Militia and Defence, approved formation in 1914 of the Canadian Aviation Corps, and authorized an expenditure of not more than $5,000 on the purchase of a single biplane. The aircraft, a Burgess-Dunne, with two pilots accompanied the First Contingent overseas in October 1914; thus came into existence the birth of the Royal Canadian Air Force . . . today a world power in military aviation and Canada's first line of defence. Since that day when the nucleus of the RCAF consisted of one provisional commander (with rank of Captain) and one other officer, the RCAF at the peak of World War II had grown into a great organization of over 250,000 men and women.

Canadair

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CIVIL AVIATION . . .

BREVITIES

A BRISTOL Freighter of Associated Airways recently carried a five-ton caterpillar tractor 400 miles from Edmonton, Alberta, to Fort Resolution, on the Southern shore of the Great Slave Lake.

* * *

Brazil and Turkey have agreed to establish regular routes and services between the two countries—immediately or when convenient. The routes contemplated are, by Turkey: Ankara, Istanbul, Athens, Rome, Madrid, Lisbon, Dakar (or Salt Island), Recife (or Natal), Rio de Janeiro (or São Paulo), in both directions, and to the countries beyond by reasonably direct routes: by Brazil: Rio, Recife (or Natal), Dakar (or Salt Island), Lisbon, Madrid, Rome, Athens, Istanbul, Ankara in both directions.

* * *

Seven international airlines became members of S.I.T.A. (Société Internationale des Télécommunications Aéronautiques) during 1951. Membership of the Society, formed in 1948 to share and develop on a non-profit basis existing communication facilities, now stands at 16 companies, including all the major international airlines.

* * *

A recent Australian Gallup Poll on the question of amalgamating Trans-Australia Airlines and Australian National Airways found that 43 per cent opposed the proposal, 28 per cent supported it and 29 per cent "didn't know."

* * *

Dollar-spending tourists visiting Britain this year will be provided by the British Travel and Holidays Association with a new guide to hotels, which gives the answers to such vital questions as "Has it a bath?" "Is it centrally heated?" The booklet will be distributed free overseas but limited quantities are also available, at 2s. 6d. per copy, from the Association's London office at 64-65 St. James's Street, S.W.1.

* * *

The Texas Engineering and Manufacturing Co. has been awarded a $500,000 contract by Pioneer Air Lines for modification of nine Martin 2-0-2s for local services.

* * *

I.C.A.O.'s aid to Iceland is to be greatly expanded by the provision of an advisory team consisting of a civil aviation expert (who will act as chief of the mission), two radio advisers and a pilot instructor. Icelandic navigation-aid requirements have been studied on the spot for the past five months by an American specialist seconded to I.C.A.O.

* * *

A K.L.M. Skymaster is being chartered by the C.O. of a Wimbledon A.T.C. squadron to take 55 cadets to Amsterdam in August. On arrival the party will make a conducted tour of Schiphol Airport as the guests of K.L.M.

* * *

Japan Air Lines have introduced a stop at Komaki Air Base, Nagoya, on their Tokyo-Osaka route. The aircraft used are Martin 2-0-2s, and the new schedule is: depart Haneda Airport, Tokyo, 10.30 a.m.; arrive at Komaki 11.35 a.m.; and at Itami Air Base, Osaka, at 12.30 p.m.

FROM THE CLUBS

AT the Annual General Meeting of the London Aeroplane Club, held recently, it was disclosed that membership had risen slightly and now stood at 240, and that the total of 1,966 hr 50 min flown during the year ended March 31st showed an increase of 300 hr over the figure for last year.

The Air Training Corps flying scholarship scheme, it was stated, had again been a very valuable contribution; 11 cadets had completed their training, three were at present under instruction and four started during the Easter holidays.

The L.A.C. has not, it appeared, been without its worries, and the loss of their C.F.I., Mr. D. A. Cather, A.F.M., who recently left to go to Canada, had made itself felt. However, the club now has its old friend Don MacBeath in charge; he has been a part-time instructor with the club over the past four years.

The de Havilland directors have agreed to assist members of their organization to gain experience as pilots by allowing them to fly at a special rate of £1 per hour, and this move should help to boost the club flying hours very substantially.

Mention was made during the meeting of the L.A.C. Garden Party, to be held on Saturday, June 14th. Invitations had been extended to the Vintage Aeroplane Club and to the Herts County Auto and Aero Club, with the result that the Auto Club has arranged a series of driving tests to take place in the early afternoon, while the Vintage Aeroplane Club has also agreed to support the event in strength. The London Aeroplane Club will, however, be pleased to receive further suggestions for suitable events in order to make the day an unprecedented success.

THE Australian Minister for Air, Mr. William McMahon, announced recently that more than £40,000 had been paid to the Aero Clubs by the R.A.A.F. in fees for training of Citizen Air Force pilots of various categories. Mr. McMahon said that the exact figure to the end of January was £44,967 for 8,756 hr of training by various clubs throughout the Commonwealth.

The R.A.A.F., he said, trained all pilots in the permanent Air Force, but *ab initio* training of Citizen Air Force pilots had been handed over to the clubs. A small amount was also being done by civil flying schools.

General Reservists, trainee pilot-cadets of C.A.F. squadrons, University Squadron Cadets, National Servicemen and A.T.C. Cadets chosen for pilot training, were given 50 hr training by club and civil school instructors. Fifty hours took them up to the standard of a private flying licence.

Apart from the financial aid given to the clubs by this scheme, continued Mr. McMahon, the value to the nation is that the clubs and civil schools were in this way developed to meet R.A.A.F. needs, particularly keeping in mind the need for expansion in time of war. The clubs formed the only large organization that could be immediately used in time of war for the training of pilots.

IN conjunction with the Goodyear Trophy Race at Wolverhampton tomorrow, May 17th, the Wolverhampton Aero Club is staging a flying display, the programme of which will include an aerobatic demonstration by jet aircraft and parachute descents by the Parachute Regiment. The display begins at 1440 hr and the race at 1500; visiting pilots must arrive by 1300. Admission will be: Adults, 2s 6d; children, 1s 6d; motor vehicles, 3s.

GOODYEAR TROPHY RACE—PILOTS AND AIRCRAFT

No.	Reg.	Pilot	Aircraft and Engine
10	AIYU	E. F. Wild	Piper Cub (Continental A-65)
12	AHGZ	C. Gregory	Taylorcraft Plus D (Cirrus Minor I)
19	APIV	J. R. Batt	Chilton D.W.1A (Train 4T)
23	AIGH	L. E. Mason	Autocrat (Cirrus Minor II)
20	AFPN	D. R. Robertson	Moth Minor (Gipsy Minor)
14	AHSA	S/L. J. Findlay	Avro Tutor (Lynx 4C)
25	AJYY	G. A. Farley	Autocar (Gipsy Major I)
27	AMOS	T. W. Hayhow	Aiglet (Gipsy Major IG)
51	ABUS	C. G. Alington	Comper Swift (Niagara III)
34	AJJI	S/L. L. S. Loveridge	Hawk Trainer III (Gipsy Major I)
68	AKRV	F/O. M. R. T. Chandler	Hawk Trainer III (Gipsy Major I)
39	AKPE	D. C. Jemmett	Hawk Trainer III (Gipsy Major IC)
35	AJYZ	W. P. Bowles	Messenger IIA (Cirrus Major III)
29	AJOE	F/L. H. E. Gibson	Messenger IIA (Cirrus Major III)
54	AKDN	P. Fillingham	Chipmunk II (Gipsy Major 10C)
5	AHUU	G. F. K. Donaldson	Globe Swift (Continental)
77	AHWR	H. Wood	Proctor V (Gipsy Queen II)
31	ADTD	G. C. Marler	Falcon (Gipsy Six 1)
95	AECC	S/L. J. Ruth	Falcon (Gipsy Six 1)
94	AKKB	F. Dunkerley	Gemini 1A (2 Cirrus Minor II)
90	AKDC	J. N. Somers	Gemini III (2 Gipsy Major 1C)
96	ADGP	R. R. Paine	Hawk Speed Six (Gipsy Six H.C)

AN air display has been organized by the Midland Aero Club, to take place on June 2nd (Whit-Monday) at Elmdon Airport. The programme will include, among other items, a bombing competition open to visiting club aircraft; two machines from each club may enter, and those interested are asked to submit their names by May 19th. The winner of the bombing competition will be presented with a handsome silver trophy.

MANY private pilots will, we feel sure, be interested to learn of the re-issue of the Pilot's Calculator which Shell-Mex and B.P. originally issued in January, 1951. Designed by Mr. J. C. C. Taylor, M.B.E., the company's aviation sales manager, the calculator was produced to assist private pilots flying under V.F.R. conditions, and gives a ready reference for courses and distances to almost all U.K. civil airfields likely to be used. Many useful conversion scales are also provided and the calculator should be particularly helpful to student pilots flying within a small radius of their home airfields. It is obtainable at 2s. from the Aviation Department of Shell-Mex and B.P., Ltd., Shell-Mex House, Strand, London, W.C.2.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Quick Trip Home

LEAVING Goose Bay, Labrador, at 1500 hr on May 9th, Air Chief Marshal Sir Hugh P. Lloyd flew home to Binbrook in 5 hr 55 min flying time, an average of 389.5 m.p.h. for the 2,305 miles. He was a passenger in the Canberra in which he went to Canada on April 18th to visit the Royal Canadian Air Force.

The itinerary of his homeward journey was: Depart Goose Bay 1500 hr B.S.T., arrive Keflavik, Iceland, 1820 hr; depart Keflavik 2035 hr, arrive Binbrook 2310 hr. Shortly after his arrival at Binbrook, Sir Hugh left in his D.H. Devon for Booker, Bucks, where he landed at 0145 hr.

R.C.A.F. Sabres to Fly Atlantic

WHEN No. 439 Squadron, R.C.A.F., joins the Canadian Fighter Wing at North Luffenham in the early summer they will fly their Canadair-built F-86E Sabres from Uplands, Ottawa, via Labrador, Greenland, Iceland and Kinloss in Scotland. This will be the first time the R.C.A.F. has flown jet aircraft to Britain from Canada.

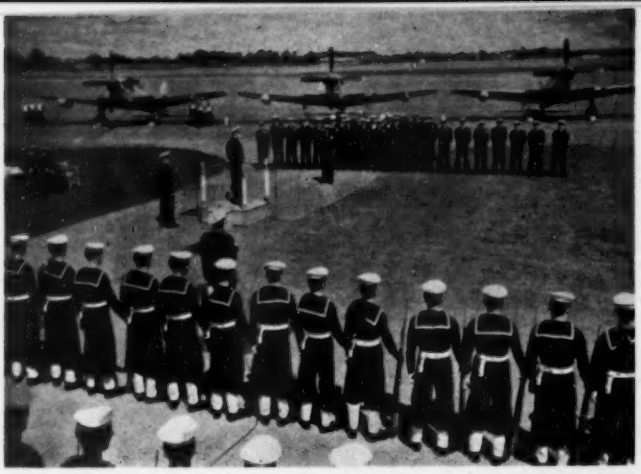
S/L. I. L. Hallam

WE regret to record that in an accident which occurred last Saturday near Methlick, Aberdeenshire, S/L. I. L. Hallam, Commanding Officer of Aberdeen University Air Squadron, was killed. Mr. John Lawrie, who was flying with him, also lost his life. The aircraft was on a training flight from Dyce.

Cambridge V.R. at Home

VOLUNTEER RESERVE units at Cambridge held their annual "At Home" on May 3rd, when, in spite of depressing weather, a full afternoon's flying was completed to schedule. The Chipmunk competitive formation event was most keenly contested, and the final placing was: (1) C.U.A.S.; (2) No. 22 R.F.S.; (3) the Varsity Flight. Sgts. Clay and Hogg (at 35ft and 37ft 6in respectively) won the spot-landing for the R.F.S., P/O. Fonseca (C.U.A.S.) coming third at 42ft 6in.

Demonstrations included a parachute descent from an Auster and displays by a noisy Spitfire and a very quiet target-towing Beaufighter: following the Beau came F/L. James from C.F.S., whose Meteor T.7 was several times hidden in a shock-front precipitation cloud. Altogether, the programme reflected the excellent spirit—particularly noticeable at Cambridge—which exists between Regular and V.R. personnel and civilians.



NAVAL OCCASION: The scene at Lee-on-Solent on Wednesday of last week, when Vice-Admiral C. E. Lambe presented the Boyd Trophy to No. 814 Squadron, which it had earned by its contribution to naval night-flying during the 18 months ended last December.

Lt. Cdr. A. C. Lindsay, D.S.C., R.N.

THERE can be little doubt that many people attending the Boyd Trophy presentation (pictured above) deeply felt the absence of Lt. Cdr. Andrew Cameron Lindsay, D.S.C., R.N., who commanded 814 Squadron during the period for which the trophy was awarded. Lt. Cdr. Lindsay was killed whilst flying an Attacker from West Raynham about a month ago. He was given command of No. 806 Squadron in 1945 when only 23 years old; was on No. 6 Course of the Empire Test Pilots' School; and served in the Naval Air Fighter Development Unit for two years prior to taking command of 814 Squadron in 1950.

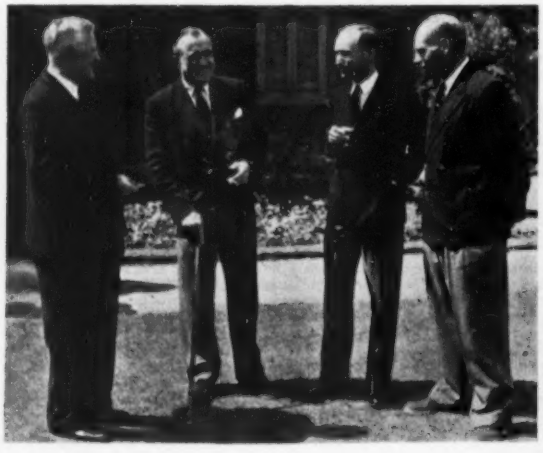
The Meteor in Korea

THE C.A.S. of the Royal Australian Air Force, Air Marshal J. D. I. Hardman, is back in Australia from his recent tour of Korea and Japan.

Of his visit to No. 77 Squadron, R.A.A.F., who fly Meteors, he had this to say: "Although some criticism of the Meteor has been made in Australia, in Korea the men who fly and maintain it say it is a first-class aircraft, that it gives no maintenance trouble at all. The life of the Derwent engines is being extended. They don't seem to be able to wear them out.

"The Meteor 8 is particularly good for its rocket-attack rôle because, apart from anything else, it has two jet engines and can get back home even with one of them shot away. The morale of the entire unit is very high. The pilots are happy in the work they are doing."

Air Marshal Hardman also expressed the opinion that the pilots flying the Mig-15s over Korea were there for training. It appeared that there was a five-week cycle during which the student pilots would gradually work up to the point where they would make an attack against U.N. aircraft,



TWO CELEBRATIONS: (Left) Marshal of the R.A.F. Sir John Slessor at the opening of the new R.A.F. Yacht Club H.Q. With him are, left, G/C. Haylock (Commodore), W/C. Lywood (Vice-Commodore) and G/C. Carr (Rear Commodore). (Below) At the Hull U.A.S. first annual dinner: The Principal, J. H. Nicholson, B.A., M.A., is seen with Air Marshal Sir Ronald Ivelaw-Chapman, A.O.C-in-C. Home Command and W/C. A. J. M. Smythe, Wing Commander Flying at Leconfield.

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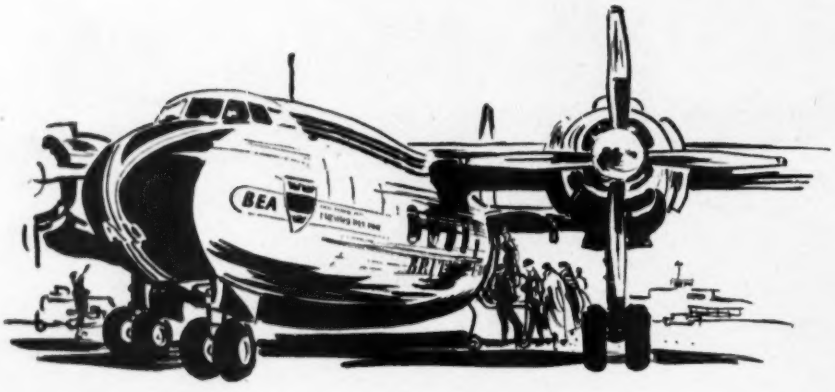
ZURICH, ROME, MILAN,
STOCKHOLM, COPENHAGEN, VIENNA



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B R I T I S H E U R O P E A N A I R W A Y S

(Left) *The crew of the second Canberra to be delivered to Australia. S/L. P. G. Fisher, the pilot (right) has just completed an Empire Test Pilot's course at Farnborough and F/L. J. Thorpe, the navigator, who has spent the last two years as a staff officer in Britain.*

(Right) *NEVER TOO OLD : Capt. R. T. Paul, R.N., has recently qualified to fly jet aircraft—at the age of 41. In this picture he is seen being briefed by Lt. J. R. Higgs, R.N., for a flight in a piston-engined type—a Firefly.*

SERVICE AVIATION . . .

but even then only under very favourable conditions.

Another story he told was of an American Sabre pilot w.o had severely damaged one of two Migs flying together. The second Mig kept on flying alongside the damaged one, until the pilot of the damaged aircraft baled out. The second pilot immediately followed him—baling out of a perfectly good Mig 15. The pupil had simply slavishly followed his instructor.

A Brave Man's Son

FOLLOWING an appeal by the R.A.F. Escaping Society, Mr. R. L. A. Freebairn-Smith, headmaster of Cliftonville Preparatory School, Margate, has offered a place in the school to a ten-year-old Belgian boy, Michel Dricot. Michel's father was shot by the Germans for helping some 200 Allied aircrew to escape.

R.I.I.A. Middle East Course

OFFICERS from all three services will be selected to attend the next three-day course to be held at Chatham House, St. James's Square, London, S.W.1, at which the subject will be "The Middle East." This course, which opens on June 12th, has been arranged by the Royal Institute of International Affairs at the joint request of the Admiralty, War Office and Air Ministry.

The Deputy Chief of the Air Staff, Air Chief Marshal Sir John Baker, who until recently was A.O.C.-in-C. M.E.A.F., will introduce the course.

Lectures given will include "The Importance of the Middle East to the Western World," "The Middle East and the World Conflict," "Soviet Objectives in the Middle East," "Oil in the Middle East," "Egypt and the Sudan" and "A Strategical Summing-up."

R.N.V.R. Air Divisions

ADDRESSING the officers and ratings of No. 1833 R.N.V.R. Squadron at the conclusion of his recent visit of inspection to R.N. Air Station, Bramcote, Nuneaton, Vice-Admiral W. R. Slayter made the first public announcement of the Admiralty decision to re-organize the structure of the air branch of the R.N.V.R.

He said that certain of the five R.N.V.R. squadrons would soon be raised to the status of Air Divisions. Each of these would comprise several squadrons (smaller units than the present squadrons) and have a Commander R.N.V.R. in command.

Regarding No. 1833 Squadron, which is largely recruited from the Birmingham area, he said that it was not sufficiently large at the present time to be formed into a Division, although when recruiting improved and numbers increased it was possible for them to be re-organized on such a basis.

"It is very important," said the Admiral, "that we should bolster up recruiting quickly to carry us over the next two years until the young National Service pilots, now starting their training, become available to join the squadrons. It is important too that officers at present serving should complete their engagements and then re-engage for further service."

Admiral Slayter, who is Admiral Commanding Reserves, flew from Northolt to Bramcote for the inspection.

R.A.F. Benevolent Fund

IT is announced that a total of £9,224 has so far been received by the R.A.F. Benevolent Fund from R.A.F. Association branches throughout Britain as a result of collections and social efforts during Battle of Britain Week, 1951.

The R.A.F. Association branch at Abadan, Persia, which was closed after the British staff left the oilfields, recently made a contribution to the Fund of £168.

S/L. J. W. Stephens

A PILOT who lost his life in a recent air accident at Aden, S/L. J. W. Stephens, D.F.C., took part in the first raid of the war, that on the German Fleet at Wilhelmshaven. From this operation his was the only Blenheim of No. 107 Squadron to return.

Later, while still serving with No. 107 Squadron he was shot down over Amsterdam and was the only member of the crew to survive. After leaving hospital he spent the remainder of the war at the notorious Stalag Luft III.

At the time of his death he was the commanding officer of No. 8 Squadron.

Squadron Ties

THE springbok's head incorporated in the squadron's badge appears in silver against a navy-blue background on the new No. 26 Squadron tie, now available to past and present members of the unit. The price is 18s and the ties are to be obtained from the Adjutant, addressed c/o Information Division, Air Ministry, London.

Another new tie is that of No. 245 Squadron. It is in two colours, dark blue and maroon, and may be obtained from the Adjutant, c/o Information Division, Air Ministry, London. The price is one guinea.

DOWN FILTON WAY : Air Marshal Sir Basil Embry chatting with A. J. Pegg, Bristol's chief test pilot, after sampling the Sycamore's flying qualities. In the 171 are C. T. D. Hosegood, at the controls, who has with him (out of sight) A.V-M. H. P. Fraser, and S/L. W. G. G. Duncan-Smith in the rear seat. Behind "Bill" Pegg is W/C. J. H. Lapsley.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Canada's P.P.L. Subsidies

I HAVE read with interest your readers' comments on the idea of subsidising flying clubs, with the argument in mind that such clubs can produce a source of trained flyers in a time of need. Perhaps your readers would be interested in the way the Government has handled the same situation here in Canada.

To get his Private Pilot's Licence, a person keen on flying must have 30 hours' flying time, which will cost him at least $330, which is hard to come by for the average youth. However, the Government reimburses the recipient of a licence to the extent of $100; the flying club concerned also receives a similar amount.

Should the holder of the licence now wish to join the R.C.A.F., and is accepted, he will receive yet another $100, whether he becomes a pilot, navigator or radio officer.

The result is that the average pilot is not waiting for an emergency to crop up and joins the Service quite soon after getting his licence.

I did so, as well as many of my friends, and the idea appears to be sound and healthy.

St. Hubert, Quebec. GEORGE FULFORD, F/O., No. 421 (F) Sqn.

Sartorial Shortcomings

I WHOLEHEARTEDLY agree with Mr. P. J. Davis (*Flight*, May 2nd) on the question of R.A.F. uniforms.

But (shades of *Per Ardua!*) did I not myself recently view a "Chiefie" and a much-maligned A.C.H./G.D. both gallantly arrayed, not in fading blue sackcloth as of yore, but in officers' smooth blue barathea?

Is this—together with the Comet—the first blessing of the Elizabethan era or just the long-awaited improvement in the quality of R.A.F. attire?

Odiham, Hants. P. PFEIL, Ex-F/O.

[Or were they Canadians?—Ed.]

What Ails Private Flying?

YOUR contributor Vannius, in his article "What Ails Private Flying?" (April 18th), queries whether it is lack of enthusiasm. Surely the gliding clubs prove it is not that. Is the answer that a private aircraft is a terribly *expensive* and *slow* means of getting from the centre of one town to another?

A factor contributing towards the exorbitant cost is insurance—the same for an aircraft flying twenty hours a day as for one flying once a month. Surely a two-part tariff, the greater charge being based only on the hours flown, as shown in the flying log-book, would be fairer?

The slowness of inter-city flight is aggravated by the time taken at British airfields to clear paperwork; this usually averages between twenty minutes and one-and-a-half hours, sometimes with very long walks between aircraft, control tower, and other departments. It would help if an easily accessible central office could deal with it all by telephone, or, as second best, if permission to taxi from one department to another along the perimeter track be granted.

The days of flying for the sake of flying should have been over long ago, and the business aircraft should be competing with the car, as it does in the U.S.A. and Canada; but here, with the opening of the air-ferry service, the car is still winning—even for journeys overseas.

Imagine having to spend an hour-and-a-half filling in paperwork and taking a two-mile walk in order to fill your car with petrol!

London, N.W.2. CHARLES VINTEN.

Stratospheric Security

THE maiden passenger-carrying flight of the world's first jet airliner is likely to remain news for a long time to come, and I have been speculating with some uneasiness on the possibilities which may suggest themselves to those who owe their livelihood to publicity in all its forms.

It seems a fair assumption that on the maiden voyage some at least of the passengers were carefully selected. Though a few might have been tempted to balance threepenny-bits edgewise in secluded corners, it is unlikely that more startling examples of bad form were exhibited. But, Sir, the maiden voyage now being over, I foresee a determined onslaught by a variety of factions to cash in on the publicity value of this unique airliner. We may be in danger of finding on our breakfast table one morning a photograph of the first chef to toss a pancake above the 40,000-ft line. The first baby to fly at more than 500 m p.h. may be all set for a film contract when old enough to articulate. The knitter of the first sonic bedsock, the *coiffeur* of the first pressurized perm, even the consumer of the first stratospheric sardine—all these may be awaiting the opportunity to Make History.

It is unlikely that the more spectacular forms of aerially engaging public curiosity, such as getting married, will be permitted by the Corporation. But one cannot discount what may be termed pilot persuasion—at the pistol-point—as has several times been demonstrated by some of those anxious to say good-bye to Eastern Utopias. To illustrate what I mean by a simple example: suppose the agent of a female film star decides that her forthcoming marriage to a public figure (such as a wall-of-death rider or a Sicilian bandit) should be celebrated at a height of 45,000ft and a Mach number of 0.8. They would have no choice but to use the Comet; and if red tape on the part of the Corporation prevented their doing this legally, then pistols might have to be used.

I therefore suggest, Sir, that when the captain of this magnificent aircraft next engages in public transport he should be well armed, and ordered to treat with the utmost severity any tendency towards unethical behaviour on the part of the passengers. Besides ensuring the safety of the crew and an extremely valuable aircraft these measures may also tend towards the more profitable use of imported newsprint during the summer months.

Eglington, N. Ireland. BROOKS WALFORD, Lt. Cdr., R.N.

Comet-Flight-planning

THE operational performance of the Comet, and the factors affecting it, have been keenly debated wherever airmen have met during these last two years, but the April 25th issue of *Flight*, devoted largely to this remarkable aircraft, is the most complete review yet to appear in print.

From the professional airman's point of view, the article devoted to flight-planning, operation and navigation, was, without a doubt, the most interesting and controversial. Perhaps some comments upon it may be admissable.

The actual flight-planning does not appear to differ widely from the methods in general use. The point of starting with the landing weight and working back—primarily to ascertain the largest possible fuel uplift—can be applied to any aircraft but is not usually necessary. Since flight-planning and cruise-control are also "cut and dried" on piston-engined aircraft in airline service it scarcely differs here either.

There is nothing new in the idea of the "How Goes It." It is a convenient method of showing graphically what is usually done by the navigator or engineer on a long sector, when a long-range cruise procedure is being operated, or when fuel has been restricted to the safe minimum. There are several other methods. One is to show on the chart the actual fuel remaining compared with what should remain, according to the flight plan, as certain points are passed.

It is certainly highly desirable for upper-wind forecasts to be accurate and navigational aids improved, but this will be a very slow business, and the most efficient use must be made with what exists. At night this means astro.

No valid reason has yet been advanced as to why astro should be of less use on the Comet than on a slower aircraft. Any really experienced navigator, as standard practice, will obtain an astro fix in an overall time of 17 minutes, including all calculations and plotting, and have the fix on the chart two minutes after the third sight has been completed.

Really accurate navigation seems desirable for two major reasons. One is the critical nature of the E.T.A. descent-point, and the other is that, on most aircraft an allowance of up to four per cent is normally made for navigational deviation. A one-and-a-half per cent to two per cent reduction might mean 400 to 500 lb increase in the fixed net load capacity.

In view of the freely admitted operational problems involved, it seems unwise that the pilotage and navigation is now carried out by only two officers instead of the more usual three carried on medium- to long-range aircraft. Some misgivings have been expressed in informed circles upon this point. It does not appear to be yet generally accepted that the speed of working, which affects such prime essentials as the E.T.A. descent-point, and the accurate revision of destination E.T.A.'s required by A.T.C., is in direct ratio to the navigator's experience.

Burnt Oak, Middlesex. E.P.

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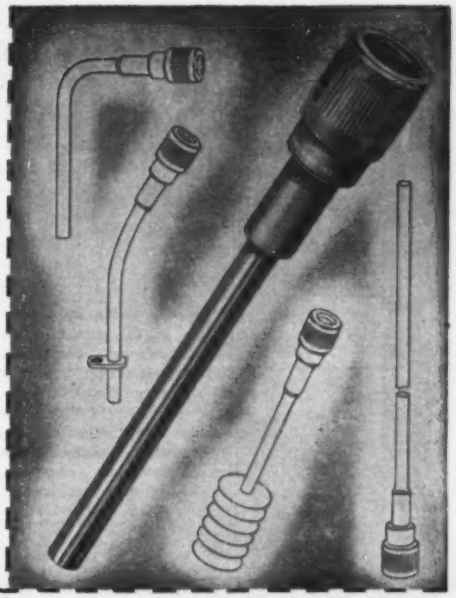

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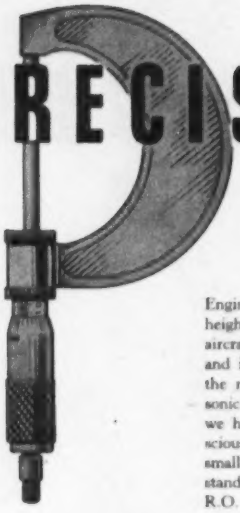

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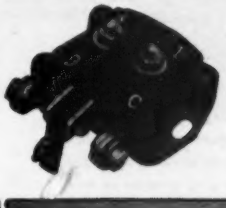

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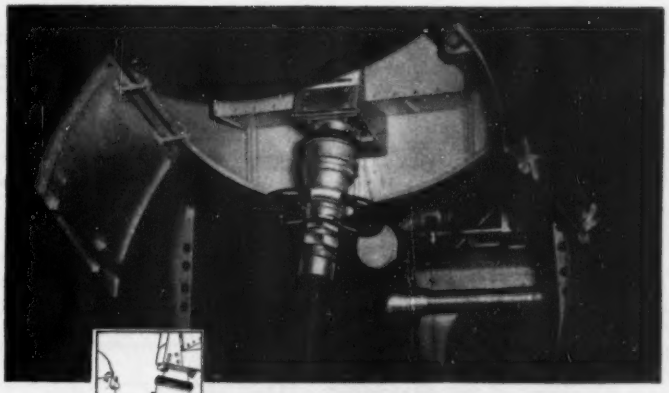

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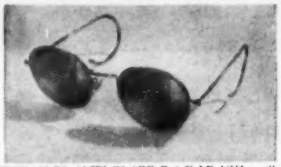

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BELLMAN HANGARS, *Ltd.*, Terminal House, London, S.W.1. [7977

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Amey, Messrs. R. J. Moffat and Co., Percy House, 796, High Rd., Tottenham, N.17. Tel.: Tottenham 2039-4-5. [6584

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [8012

PATENTS

THE proprietor of British Patent No. 570026, entitled "Improvements in Devices for mounting cameras, bomb-sights and the like apparatus on airplanes in level and oriented position, offers same for license or otherwise to ensure its practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, Chrysler Building, New York 17, N.Y., U.S.A. [8102

PLANT FOR SALE

FOR sale. One modern panel-beating hammer by Bretts. Cast steel top weighing 25 cwts, having face 50in. square. Base block 6ft square face. Self-contained job. Drive optional compressed air or electric motor. Only done two years' work.

THOS. JENKINS & SON (B.F.), Ltd., Exchange Buildings, Port Talbot. [8099

TIME RECORDERS

STAFF item checking and job-costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 7291. [8049

TUITION

LEARN to fly for £34; instructors' licences and instrument flying for £3 an hour; night flying £3/10/- an hour, residence 41 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [8093

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass, no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free.—B.I.E.T. (Dept. 70D), 17, Stratford Place, London, W.1.

FREE! Brochure giving details of courses in all branches aero eng. covering A.F.R.Ae.S., M.C.A. exams, etc. We are the only postal training college operated by an industrial organisation.—Write to E.M.I. Institutes, Postal Division, Dept. F39, 43 Grove Park Road, London, W.4. Tel.: Chiswick 4417. (Associated with H.M.V.) [8026

South African Railways photograph

DOUGLAS D.C.4
SKYMASTERS

Announcing several Douglas D.C.4 Skymaster aircraft for sale.

All the machines on offer will be fresh from an 8,000-hour airframe overhaul and, with one exception, are fitted with engines having nil hours since overhaul and with fully overhauled propellers, radio and ancillary equipment. One machine is fitted with luxury seating, whilst the remainder are fitted for high-density capacity—68/70 passengers.

Delivery: Two machines in approximately one month, balance for delivery in September.

Payment: American Dollars stated, but part-payment in softer currencies might possibly be accepted.

Full details will gladly be sent on request

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PERSONAL coaching for Commercial Instrument Rating, Senior Commercial, A.L.T.P. (conversion thereto) and Flight Navigator licences. This school provides the most rapid and economical method of qualifying. I.C.A.O. standards.

COMPLETE "Study-as-you-work" courses. Simulates classroom instruction; lessons, questions, model answers. Unique in application, ideal those employed or seeking career from Services.

LINK instruction and R/T for all Instrument Rating procedures. Any form of flying training at best quotations.—Brochure with terms: 6-10, King Street, London, W.6. Tel.: Riv. 7988. [8077

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Essex. Tel.: Rochford 54004. Comprehensive training for private commercial licences and instructors' endorsements, M.C.A. approved for 20-hour course. Auster aircraft fitted with radio. Hourly rates: Solo, day £3, night £4, dual 5/- extra; contract rate £2/10/-; Link trainer 10/-. No fees or subscriptions. Please write for further details.

2-YEAR approved course for Aircraft Engineer "A" & "C" licences. Commercial Pilots and A.L.T.P. technical instruction for General and Type rating, conversions, etc. Longer Diploma Course combines full day workshop and technical training for executive appointments. Syllabus from College Secretary, College of Aeronautical and Automobile Engineering, Chelsea, S.W.3. Flaxman 0021. [0091

LEARN to glide this summer. Between June and September the British Gliding Club are repeating their highly successful series of holiday gliding courses. Instruction for International "A" and "B" certificates under ideal conditions. All flying, temporary club membership, hotel accommodation and meals included in the comprehensive charge of 12 gns.—Further details from Hon. Course Secretary, 1 Upper Belgrave Road, Bristol 8. [8039

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

THE DE HAVILLAND AIRCRAFT CO., LTD.

have vacancies for

SENIOR
AND INTERMEDIATE DESIGN
DRAUGHTSMEN

in their

HATFIELD AND LONDON OFFICES.

Men with experience in

STRUCTURES DESIGN

MECHANICAL DETAILS

ELECTRICAL INSTALLATIONS

are invited to apply.
Aircraft experience
preferred, but applications
will be considered from
men experienced in Light
Mechanical Engineering
or Wiring Layouts, Design
of Electrical Junction
Boxes, etc.

Large programme of work
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CIVIL JET AIRLINERS
AND MILITARY AIRCRAFT.

Apply in writing to
CHIEF DRAUGHTSMAN,
DE HAVILLAND AIRCRAFT CO., LTD.,
HATFIELD,
HERTS.

APPLICATIONS ARE SUBJECT
TO APPROVAL OF M. OF L.
AND NATIONAL SERVICE [8021

NORMALAIR Limited, Yeovil, invite applications from the following for work in connection with aircraft air-conditioning, pressuring and high-altitude breathing equipment:—

DRAUGHTSMEN.
TECHNICIANS.
TECHNICAL WRITERS.
TECHNICAL ILLUSTRATORS.

APPLICATIONS, stating age, experience and salary required should be addressed to: Employment Exchange (N.A.), Yeovil. Local interviews will be arranged where convenient. [8020

ENGINEER A. and C. to cover D.H. Rapides at London and Northolt Airports.—Write Box 6023. [8125

SITUATIONS VACANT

CITY OF COVENTRY EDUCATION COMMITTEE
COVENTRY TECHNICAL COLLEGE

Principal: H. V. FIELD, B.Sc., Wh. Sch., M.I.E.E.

APPLICATIONS are invited from suitably qualified persons for appointment as full-time teacher of METALLURGY.

CANDIDATES should have an Honours Degree in Metallurgy or equivalent qualifications, industrial and teaching experience are desirable.

SALARY in accordance with Burnham Technical Scale for Assistants Grade B.

DUTIES to commence on September 1st, 1952, or as soon as possible after that date.

APPLICATION forms and further particulars obtainable from the undersigned to whom completed forms should be returned WITHIN 14 DAYS of the appearance of this advertisement.

W. L. CHINN, M.A.,
Director of Education,
Council House,
COVENTRY.
17-4-52 [8101]

VICKERS-ARMSTRONGS Ltd. (Aircraft Section) have vacancies at Hurn Depot for the following staff:—
AIRCRAFT STRESSMEN
DESIGN DRAUGHTSMEN
(aircraft experience preferable, but not essential)
JIG AND TOOL DRAUGHTSMEN
(aircraft experience preferable, but not essential)
FLIGHT TEST OBSERVERS
(experienced on modern aircraft).

APPLY in writing, to Employment Manager, Vickers-Armstrongs Ltd. (Aircraft Section), Weybridge, Surrey. Applications are subject to approval of the Ministry of Labour and National Service. [8100]

INSTRUMENTS. Urgently required, "X" licensed engineer (physical instruments only). Vacancies also for mechanics with experience of complete overhaul of non-electrical instruments.

Apply:
PRENTICE AND TRAFFORD,
LIVERPOOL AIRPORT,
SPEKE,
LIVERPOOL, 19. [8105]

AIR SERVICE TRAINING, Ltd., require:—

(a) FLYING INSTRUCTORS—qualifications R.A.F. Category for duties at home.
(b) FLYING INSTRUCTORS—qualifications Category "A" for conversion duties at Karachi, experience on National aircraft desirable. Salary approximately £2,000 per annum.

APPLICATION should be made to: The Commandant, Air Service Training, Ltd., Hamble, Hants, for formal application, marking letters and envelopes, P.I. [8107]

HANDLEY PAGE, Ltd., have vacancies for:—

AERODYNAMICISTS of degree standard or with H.N.C. in aero subjects. Previous experience preferred.
WIND tunnel technicians of degree standard or with H.N.C., in aero subjects. Previous experience preferred.
STRESSMEN of degree standard or with H.N.C. in aero subjects. Previous experience preferred.
WEIGHTS control engineers with minimum qualifications of O.N.C. Previous experience preferred.
SENIOR design and intermediate draughtsmen, preferably with aircraft experience, for Cricklewood and Radlett offices. Consideration will be given to applicants with experience in light structural or mechanical engineering. Possession of O.N.C. or H.N.C. (Mech., or Elect.) an advantage.
LOFTSMEN with previous experience of full-scale layout work or similar workshop practice.
TECHNICAL authors, preferably with experience in the preparation of maintenance manuals, pilots' notes, technical specifications, etc.
TECHNICAL illustrators with previous experience in aircraft work. Write, stating age, qualifications and details of experience, to: Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [7760]

D. NAPIER AND SON, Ltd., The Airport, Luton, Beds. have vacancies for the following:
RESEARCH engineer or applied mathematician for work on advanced problems of stress analysis in connection with guided missiles.
HONOURS degree essential, some aircraft stress office experience desirable.

ALSO
GRADUATE engineers or mathematicians required for work on aero elastic and/or flutter problems on guided missiles. Aircraft experience of similar work desirable.
APPLICATIONS, stating age, experience, salary required, etc., should be sent to the local Employment Exchange. [8116]
SHORTHAND typist, with clerical experience, required in buying department.
YOUNG male assistant for sales department, aged about 20.
WRITE in the first instance giving full details of experience, etc., to:—
AVIATION TRADERS, Ltd., 15, Great Cumberland Place, London W.1. [8095]
HANDLEY PAGE (Reading), Ltd., The Aerodrome, Woodley, Reading, have the following vacancies in their Design Office:
SENIOR and intermediate aircraft draughtsmen.
SENIOR aircraft electrical draughtsman.
SENIOR aero-dynamicist to take charge of their small Aerodynamic Section.
JUNIOR weights engineer with at least two years' experience.
PLEASE send full particulars to The Personnel Officer. [8074]

THE DE HAVILLAND AIRCRAFT Co., Ltd., Airspeed Division, Christchurch Aerodrome, Hampshire, require the following personnel:—
ELECTRICIANS for aircraft modification work in the field and aircraft maintenance engineers with "X" Licences on modern aircraft.
APPLY to the Personnel Manager of the above firm. [8097]

THE DE HAVILLAND AIRCRAFT Co., Ltd., Airspeed Division, Christchurch Aerodrome, Hampshire, require the following personnel:—
JUNIOR and intermediate draughtsmen, with aircraft experience preferred but not essential. Required for expanding programme. Military and civil aircraft.
APPLY to the Personnel Manager of the above firm. [8096]

REQUIRED IMMEDIATELY BY WELL-KNOWN AUTOMOBILE ENGINEERING FIRM IN NORTH WEST DISTRICT

Designers and Detail Draughtsmen, Jig and Tool Draughtsmen—also Planning Engineers

THESE VACANCIES OFFER GOOD CONDITIONS AND PROSPECTS TO SUITABLE APPLICANTS. SALARY ACCORDING TO AGE, EXPERIENCE AND QUALIFICATIONS

Apply Box No. 8013, *c/o Flight*

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VIKING CAPTAINS and RADIO OFFICERS
Standard Salaries Payable
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Bovingdon 2296 *Extension 14*

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Undercarriages—all parts available.
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Exhaust Tail Pipes, Brake Drums.
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Ministry of Civil Aviation Approval
MARSHALL FLYING SERVICES LTD.
THE AERODROME, CAMBRIDGE
Tel.: CAMBRIDGE 55291

SITUATIONS VACANT

STARWAYS, Ltd., require pilots for Dakota, Anson and Rapide aircraft.—Reply immediately.—Starways, Ltd., Liverpool Airport, Liverpool 19. Tel.: Garston 5670. [8104]

SEVERAL senior airframe stressmen and draughtsmen required for extensive programme of new design work. Auster Aircraft, Ltd., Rearsby Aerodrome, Leicester. [8098]

D. NAPIER AND SON, Ltd., Luton Airport, Luton, Beds. require technical assistant (of at least Higher National Standard) for design study section. Experience on aircraft performance work desirable.
APPLICANTS should apply to the local Employment Exchange, stating age, experience and salary required. [8109]

GULF AVIATION Co., Ltd., Bahrain, requires pilots with Senior Commercial Pilot's Licence, preferably endorsed for Dove aircraft. Emoluments free of local taxation and conditions offered include:—
(i) Basic salary starting at £1,305 and rising by annual increments of £50 to £1,536 p.a.
(ii) Generous allowances for local cost of living and separation from family.
(iii) Quarters equipped with heavy furniture, free for single and separated men, but subject to a nominal charge to married men with families. (Due to accommodation shortage married men must be prepared to accept an initial period of separation.)
(iv) Free medical facilities for men and families.
(v) Home leave with free passages at the rate of eight weeks for each year's service in Bahrain.
APPLICATIONS should be addressed to the Staff Manager, B.O.A.C. (U.K. Stations and Overseas), Airways House, Great West Road, Brentford, Middx. [8110]

REQUIRED: experienced licensed engineer, "A" and "C" ("B" an advantage). Dakota, (Bristol Freighter an advantage). Four years' contract in East Africa.—Box 2954. [8088]

WANTED, one assistant pilot instructor. Qualifications: current instructor's licence.—Apply, stating experience and salary expected, to Karachi Aero Club, Ltd., Post Box 249, Karachi, Pakistan. [8090]

STORMAIR, Ltd., Yeovil, Somerset, require experienced progress chasers, preferably with aircraft or instrument manufacturing background.—Apply, Employment Exchange (N.A.), Yeovil. [8094]

D. NAPIER & SON, Ltd., Luton Airport, Beds. have a vacancy for a radio mechanic, fully conversant with all radio equipment fitted to modern military and civil aircraft, A.R.B. Licence standard for preference.
PLEASE apply, giving details of experience, to nearest Employment Exchange. [8079]

AIRCRAFT engineer required, licensed "A" and "C". Aerovans for Jersey. Salary £50 month; low income tax rates.—Phone London, Ewell, 2907. Write Chanair, 35 Hillgrove Street, St. Helier, C.I. [8077]

JIG and tool draughtsmen required for Percival Aircraft, Ltd., Luton Airport, Beds, fully experienced.—Applications, in writing, to Manager, Ministry of Labour and National Service, Luton, Beds. [8089]

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply by letter or telephone, to the Senior Radio Engineer, Aviation Traders Ltd., Southend Airport, Essex, Tel.: Rochford 56491. [8093]

WEIGHT estimator, required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft.—Apply, giving details of age, qualifications, experience and salary required to: Manager, Ministry of Labour and National Service, Luton, Beds. [8092]

H. ROBSON, Ltd., require at their Fordhouses, Wolverhampton, factories, several senior jig and tool, and planning engineers. These positions will carry good prospects and salaries.—Apply through Wolverhampton Employment Exchange. [8091]

JIG and tool draughtsmen, senior and junior, required for work on interesting projects. Pension scheme.—Apply to Ministry of Labour for submission to Personnel Manager, The Fairey Aviation Co., Ltd., Hayes, Middlesex. [7944]

LANCASHIRE AIRCRAFT CORPORATION, Bovingdon Airport, Herts, have vacancies for operations/traffic officers.—Please write to the Personnel Manager, at the above address, stating fullest particulars of experience. [8086]

LANCASHIRE AIRCRAFT CORPORATION, Ltd., require qualified pilots, navigators and radio officers for their York fleet.—Please forward full details to the Personnel Manager, Lancashire Aircraft Corporation, Ltd., Bovingdon Airport, Hertfordshire. [8080]

ASSISTANT chief stressman required by Percival Aircraft, Ltd., Luton Airport, Beds.—Applications, giving full details of qualifications, experience, age and salary required, to the Manager, Ministry of Labour and National Service, Luton, Beds. [8087]

TECHNICAL authors and illustrators required by Percival Aircraft, Ltd., Luton Airport, Beds. Knowledge of M.o.S. procedure desirable.—Applications, in writing, stating age, experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [8099]

FULL-SCALE layout. Saunders-Roe, Ltd., East Cowes, Isle of Wight, have vacancies for men with experience of this work and for those qualified to learn.—Applications, stating age, details of experience, etc., should be made to the Cowes Office of the Ministry of Labour and National Service. [8076]

TECHNICAL assistant required for interesting and varied work in modern test laboratory of heat-exchange equipment. Age 20-25.—Please apply in writing, stating age, experience and qualifications to Delaney Gallay, Ltd., Edgware Road, Cricklewood, London, N.W.2. [8075]

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience of test laboratory equipment desirable.—Applications, stating qualifications, experience, age and salary required to Manager, Employment Exchange, Luton, Beds. [8096]

CHIEF test engineer required by large firm, S.E. England, for aeronautical division, with good technical education to B.Sc. standard. Practical experience of production problems connected with radar, hydraulic servos and electronic servos in the aircraft industry. Progressive post, pension scheme.—Write fully, stating age, experience to Box F.321 at 191, Gresham House, E.C.2. [8118]

JOSEPH LUCAS, Ltd., have a number of vacancies for engineering graduates in their training as designers on gas turbine fuel systems. The company operates a superannuation scheme and will undertake the training of graduates who have not had previous industrial experience.—Application, in writing, should be made in the first place to Joseph Lucas, Ltd., Personnel Dept., Great King street, Birmingham, 19, quoting reference N/17. [8115]

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8092]

SITUATIONS VACANT

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds., several draughtsmen with comprehensive experience of engine installations and allied systems.—Applications, in writing, stating age, qualifications, experience and salary required to the Luton Employment Exchange. [0001]

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic firing controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420]

PILOTS required for flying unit based in South-east Scotland. 1,000 hours experience Service aircraft, chiefly on fighters, with some experience on multi-engined aircraft.—Please write quoting Ref. TID/F, stating age and giving details of experience, to the Personnel Officer, Ferranti, Ltd., Ferry Road, Edinburgh 5. [0124]

SENIOR aircraft engineer required in South-east Scotland to take charge of flying unit consisting of multi- and single piston and jet Service aircraft. Experience of R.A.F. procedure essential. Preference given to licensed applicants.—Please write, quoting Ref. TID/SAE, stating age and giving details of experience, to the Personnel Officer, Ferranti, Ltd., Ferry Road, Edinburgh 5. [0127]

INTERNATIONAL AERADIO, Ltd. require experienced radio mechanics for service at overseas airports. Commencing salary from £361 p.a., plus generous station allowances tax free. Quarters provided. Pension scheme. Paid U.K. leave. Kit allowance. Please apply through Local Labour Exchange, quoting RM to Personnel Officer, 40 Park Street, London W.1. [0133]

AIRCRAFT weight engineers required by Saunders-Roe, Ltd., East Cowes, Isle of Wight. Seniors and juniors required for expansion of an enterprising department. Experienced men, and young men looking for an interesting career are invited to apply, giving details of experience, age, salary expected, etc., to the Cowes Office of the Ministry of Labour and National Service. [7097]

PLANNING engineer (aircraft) required by Percival Aircraft, Ltd., Luton Airport, Beds. Considerable practical experience of manufacture of metal airframe components and production planning essential qualifications.—Apply to Manager, Employment Exchange, Luton, giving full details of age, qualifications, experience and salary required. [0097]

IMPORTANT Midlands aircraft engine manufacturer has vacancies for a number of designers and senior and junior draughtsmen. The work is connected with gas turbine engines. Although experience is most advantageous it is not necessarily essential, as training will be given.—Apply in some detail, quoting Reference 101, Personnel Section, Bristol Siddeley Motors, Ltd., Reference 101, Coventry. [0016]

DESIGN draughtsman required by Lockheed Hydraulic Brake Co., Ltd., Leamington Spa, should be fully experienced in light mechanical engineering. Knowledge of hydraulics an advantage. Opportunity for early promotion to Section Leader grade on proof of ability. Single hostel accommodation available.—Apply: Employment Exchange. [0091]

LEADING aircraft company in the London area require senior aerodynamicist with 1st or 2nd class Honours Degree and four or five years' experience in similar capacity. Housing accommodation available to selected applicant.—Write, stating age and full particulars, to Box AC72156, Samson Clarke, 57/61, Mortimer Street, W.1. [0085]

SENIOR designer for aero-engine gas-turbine project design required in well-known firm in London area. Previous experience on mechanical design is essential. Good prospects of promotion for a suitably experienced and enterprising candidate.—Please write, stating full details of age, experience and qualifications and salary required, quoting reference ACJ to Box 3947. [0034]

DRAUGHTSMEN required for guided weapons and armament drawing office of Saunders-Roe, Ltd., East Cowes, Isle of Wight. Senior men with aircraft experience and juniors with aircraft or engineering background are invited to apply, giving details of experience, salary expected etc., to the Cowes Office of the Ministry of Labour and National Service. [7089]

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen, and stressmen for work on this interesting programme.—Write, giving details of experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [0095]

SENIOR and junior technical assistants are required for experimental and development work on gas turbines for aircraft. Candidates should have an Engineering Degree or the equivalent. Previous experience of this type of work is desirable, but not essential.—Reply, giving details of qualifications and experience to Reference JM1, Box 6056. [0108]

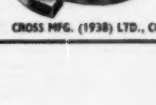
APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers.—Please write, stating age and giving details of previous experience in chronological order to the Personnel Officer, The de Havilland Engine Co., Ltd., Star Lane, Edgware, Middlesex. [0030]

INSTALLATIONS supervisor required. Applicants are invited with experience of maintenance and test of small electronic and electro-mechanical devices. Additional mechanical knowledge an advantage. Qualifications—H.N.C. standard.—Write, stating age, experience and salary required to: The Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. [0004]

INTERNATIONAL AERADIO, Ltd., require experienced ground radio operators for service overseas. P.M.G. licence essential. Single men preferred. Starting salary £955 p.a., plus adequate station allowances. Quarters provided. Pension scheme. Free air passages. Paid U.K. leave. Kit allowance. Please apply through the Local Office of the Ministry of Labour and National Service, to Personnel Officer, 40, Park Street, London, W.1. [0006]

TECHNICAL assistant required by Purolator Filters Division of Automotive Products, Ltd., Leamington Spa. Technical training to H.N.C. standard and knowledge of petrol and Diesel engine design, experimental and research experience would be valuable; familiarity with filtration problems an advantage.—Write: Personnel Officer, giving full details of age, training and experience, salary. [0091]

AIRCRAFT SPRING WASHERS



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The following **VACANCIES** exist on progressive projects of advanced interest:—

STRESSMEN
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WEIGHTSMEN
Senior and Junior.

DRAUGHTSMEN
Structural and Electrical.

ILLUSTRATORS
Senior and Junior.

Previous aircraft experience an advantage but not essential

Prospects are excellent for energetic and sound applicants

APPLICATIONS to be addressed to the **CHIEF DESIGNER** giving particulars of **Experience, Age and Salary**

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Tel.: Provence 9078. Cable: Aeropaul, Paris

46 Hertford St., Park Lane, London, W.1

Tel.: GROsvenor 8383/4. Cables: Aeropaul, London

SITUATIONS VACANT

AIRWORK, Ltd., require flying instructors for service in the north of England. Applicants should have had previous R.A.F. elementary instructing experience and should be in possession of a minimum B.1 instructors category.—Apply in first instance to Manager, Flying Training Division, Airwork, Ltd., Sutton Lane, Langley, Slough, Bucks. Envelopes to be marked "Flying Training." [0006]

PILOT required for training as Sales Engineer. Duties will include flying Company's Anson 19 on demonstration flights. Preference given to young man with electrical and/or mechanical engineering training. Minimum qualifications, commercial licence and instrument rating.—Write, with full details to the Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. [0111]

SENIOR technical assistant required for the Service Department of The de Havilland Engine Co., Ltd., preferably with experience on reciprocating and gas-turbine engines. Suitable applicant will be required to work on headquarters' staff of the Service Department at Leavesden Aerodrome, near Watford, Herts.—Apply in writing, stating age, qualifications and salary required, to the Personnel Officer, The de Havilland Engine Co., Ltd., Leavesden Aerodrome, nr. Watford, Herts. [7066]

ROLLS-ROYCE, Ltd., Glasgow, require senior and junior technical assistants for work on technical production and quality engineering. Applicants should have engineering degree or equivalent with previous experience in a similar type of work. Salary will be in accordance with experience and qualifications. Prospects of advancement good.—Applications should be made in writing to the Personnel Manager, Rolls-Royce, Ltd., Hillington, Glasgow, S.W.2, giving full particulars of experience, qualifications, etc. [7092]

BRITISH Overseas Airways Corporation have a vacancy for a draughtsman in their design office at London Airport covering all aspects of aircraft design development as affecting British and American aircraft, including unit and component conversion. Experience in radio installation work, electronics, hydraulics, modification and repair desirable. Knowledge of A.R.B. design requirements. A.R.B.D. rates of pay, attracting proficiency bonus where experience and qualifications allow. Good pension and holiday facilities. Apply in first instance to the Manager, Ministry of Labour, Feltham, Middlesex. [0130]

BRITISH EUROPEAN AIRWAYS are seeking to build up a staff of good tradesmen, men who are looking for steady employment with good rates of pay and conditions. Immediate vacancies exist for radio mechanics, airframe fitters/riggers, engine fitters, instrument mechanics and electricians. Basic rate 3s. 4d. per hour plus incentive bonus or time-workers' bonus; up to 3d. per hour proficiency pay can be earned; shift premium payments where appropriate. 44-hour week. After qualifying periods, excellent pension, insurance and sick pay schemes, two weeks' paid annual holiday, air travel concessions.—Applications, giving full information, initially in writing, to Personnel Officer, B.E.A., Northolt Base, Ruislip, Middlesex. [0036]

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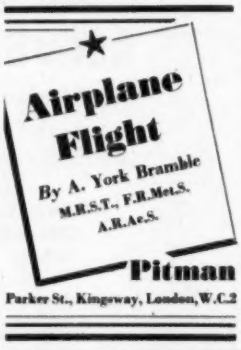

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